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# CHARACTERIZATION OF HAZARDOUS WASTE GENERATION AND DISPOSAL IN THE YUKON

Submitted to

Yukon Territory Government
Community and Transportation Services

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Mr. D.A. Dell
Director, Municipal Engineering
Community and Transportation Services
Yukon Territory Government
P.O. Box 2703
Whitehorse, Yukon
Y1A 2C6

Dear Mr. Dell:

Re: Characterization of Hazardous Waste
Generation and Disposal in the Yukon

We are pleased to submit ten (10) copies of our final report for the above-mentioned project. The report concludes that there is a need for a comprehensive hazardous waste management strategy in the Yukon.

We have enjoyed working with you and the members of the Yukon Waste Management Program Advisory Committee. We look forward to assisting you on strategy development and implementation.

Yours truly

Leslie A. Panek
Vice President
Environmental Division

SUMMARY

INTRODUCTION AND OBJECTIVES

A hazardous waste is any unwanted material in solid, semi-solid, liquid or gaseous form which cannot be disposed of by normal waste management techniques, because it poses a substantial present or potential hazard to public health, safety and the environment. The limited funds available for services required to enhance the quality of life, has historically resulted in many Canadian jurisdictions treating hazardous waste as everyday garbage. Consequently, hazardous waste has adversely affected the environment resulting in the implementation of remedial programs costing from a few thousand to millions of dollars.

The Yukon has a number of sites that have been contaminated by hazardous waste. The most notable may be the Granger subdivision in Whitehorse which has been contaminated with PCB s. The Yukon Government in response to the Granger PCB problem and others, has decided to take a proactive approach to hazardous waste management.

The purpose of this report is to characterize the types, quantities, and distribution of hazardous waste that are in place or are being generated in the Yukon and to document the existing disposal methods for these wastes.

PROJECT APPROACH

A building block approach was utilized with information collected in one step serving to focus work efforts in subsequent steps. Initially, the literature was reviewed to identify potential

generators, hazardous waste types and generation rates. The industries were then grouped together according to their activities or goods handled and produced using their Standard Industrial Classification (SIC) Code. The waste types were classified using the University of California at Davis System (UCD) which has been used in other jurisdictions with success. All generation rates were recorded and cross referenced where possible.

Upon completion of the literature search, the master list of theoretical hazardous waste generators was compared against Yukon companies identified from at least five sources. The potential Yukon generators were then grouped into four geographic regions:

- Northern region - Pelly Crossing North
- Eastern region - Carmacks to Teslin east
- Western region - Beaver Creek to Carcross
- Whitehorse region - Whitehorse proper

A questionnaire was developed to standardize interviews. A telephone and mail out process was undertaken to collect Yukon specific hazardous waste data.

Industry information developed for the Yukon must be viewed as a management tool that indicates an order of magnitude. In other jurisdictions, limitations on data have been associated with inventories because:

- generators are not knowledgeable with respect to hazardous waste they generate or are unwilling to provide accurate information to surveyors; and

- a definitive definition of waste is not available.

RESULTS

There are over 1500 companies in the Yukon and an estimated 388 are hazardous waste generators. Yukon generators are a diverse group with 28 SIC codes represented. Of the 388 companies identified as potential generators, 213 companies or 55% were contacted in this study. For the 28 SIC codes, response rates to the survey ranged from 8% to 100%.

There were 54 different hazardous waste types identified during the survey. The 54 waste types were grouped into 14 Consolidated University of California at Davis (CUCD) waste streams.

There were over 1000 tonnes of hazardous waste reported to be generated on an annual basis. This compares favourably to the 1300 tonnes that the literature rates estimated for the Territory.

The predominant annual waste streams from the generator surveys were reported to be:

- Oils and Greases - 683 tonnes/year
- Miscellaneous Chemicals and Products - 110 tonnes/year
- Sludges and Inorganic Residuals - 85 tonnes/year
- Organic and Oily Residues - 62 tonnes/year

There are over 10,000 households in the Yukon. Household hazardous wastes were estimated to contribute over 50 tonnes of waste per year to the Territory total.

In addition to annual waste streams, hazardous wastes were found to be generated on a non-routine basis. Non-routine wastes included PCBs, spill response waste, contaminated sites and DEW line sites. These wastes were difficult to quantify because they are not generated as a result of an ongoing process but from clean up

programs. Until a non-routine waste has been assessed on a site specific basis and regulatory impacts evaluated, amounts are not quantifiable. However, non-routine wastes will continue to contribute to hazardous waste generation in the Yukon because in many instances they arise from human error either past, present or future.

Hazardous waste is currently being disposed of by: land disposal (48%); burning (34%); incineration (8.3%); drain (3%); dust suppression (2.3%); or being sent out of the Yukon (0.1%). An additional 4.3% of hazardous waste is in storage.

## DATA ANALYSIS

Hazardous waste generators may be described as service companies with a small staff and limited production capability. Auto Repair Shops (SIC 75) generate the most waste with an estimated 186 tonnes per year, this is followed by metal mining (SIC 10) with an estimated annual generation of 144 tonnes. Yukon households generate over 50 tonnes of hazardous waste a year.

Oils and greases with an annual rate of 683 tonnes is the predominant hazardous waste generated. This represents 68% of all hazardous waste generated in the Yukon. Management initiatives directed at this waste stream are recommended.

Volume of waste generated should not be the sole criteria for management efforts as other waste streams have the potential to pose a greater threat to public health, safety and the environment. Heavy metal solutions and residues with an annual generation of 16 tonnes per year should be a priority management area.

The Whitehorse Region has 70% of all waste generators located within its boundaries and generates 74% of the waste. The remaining three regions have 30% of the generators within their boundaries with 26% of the waste generation.

Hazardous wastes are being stored throughout the Yukon but the types of waste stored, quantities stored and environmental integrity of these sites is not known. The only exception to this are the PCB storage sites which have been inspected by Environment Canada.

## HAZARDOUS WASTE - A REGULATORY DEFINITION

The defining of the term hazardous waste for regulatory purposes, is an important first step in the development of a management program for the Yukon. Whether wastes should be called "hazardous" or "special" is one of the first issues that must be resolved. The term "hazardous" has been noted to be misleading and frightening in other jurisdictions. The term "special" on the other hand has been viewed as a method of disguising hazardous waste. Generally the term "hazardous" has been found to be useful in maintaining public vigilance, while "special" is useful in describing a facility or management program that is to handle waste types over and above hazardous waste.

The defining of hazardous waste may be undertaken at the statutory and substantive level. The statutory definition is written in any legislation addressing hazardous waste and should be generic in nature focussing on characteristics. The substantive definition may be via a criteria approach, list approach or combination of the two. The purpose of the substantive definition

is to provide generators with the mechanism to determine whether their waste is hazardous or not.

The Alberta definition of hazardous accomplishes the objectives of a hazardous waste definition for regulatory purposes. The Yukon may wish to adopt this definition because it may eliminate some logistical concerns if Alberta opens the Swan Hills treatment facility to out of province waste.

## RECOMMENDATIONS

Hazardous waste is being generated in the Yukon on an annual and non-routine basis. Ir addition, hazardous waste is in storage awaiting disposal. A management strategy is required to deal with Yukon hazardous wastes and to prevent any adverse impacts on health, safety and the environment.

There are four main recommendations to achieve these goals:

- to develop a comprehensive Yukon hazardous waste management program that governs waste as it moves from point of generation to disposal;

- to set up a Yukon Waste Management Advisory Committee that will direct the development of the program and serve to input public and generators concerns;

- to initiate a public information process to ensure all Yukoners are aware of the program and its implication; and

- to adopt a 4R (reduce, reuse, recycle, recover) strategy for hazardous waste where practical; to construct an

interim storage facility for those waste types best sent out of the Yukon for disposal; and to properly design and operate one designated landfill for hazardous waste suitable for this type of disposal such as asbestos.

ACKNOWLEDGEMENTS

Information is this report was gathered from many sources and this cooperation is gratefully acknowledged by Monenco Consultants Limited. We would like to thank the respondents to the hazardous waste survey, for their cooperation in providing information concerning processes utilized and wastes generated. Special thanks to Art Dell of the Yukon Department of Community and Transportation Services, for his guidance, productive criticism, ideas and time. Thank you to Bob Allan of Environment Canada, who provided valuable insight and information on hazardous waste in the Yukon.

Monenco especially acknowledges the Yukon Waste Management Advisory Committee members for reviewing draft versions of this report: Ione Christensen, Rick Butler, Mike Smith, Rudy Couture, John Maissan, Judy Corley, Jack Nickel, Bob Allan, Joe Ballantyne, Rick Rovere, Judy Dabbs and Blaine Rapp. Thanks are also due to Linda Ehrlich and Karen Shell for their assistance and input.

The Monenco Consultants personnel who participated in this study were: Wit Siemieniuk, Teresa Ehman, Bruce Smedley and Ed Hood.

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# PART 1

# INTRODUCTION AND OBJECTIVES

PART 1 - INTPODUCTION AND OBJECTIVES

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## 1.1 INTRODUCTION

Humans generate an inordinate amount and diversity of waste, and the term hazardous waste has taken on a special meaning. A hazardous waste may be defined as any unwanted material in solid, semi-solid, liquid or gaseous form which cannot be disposed of by normal waste management techniques, because it poses a substantial present or potential hazard to health, safety and the environment. Hazard characteristics include corrosiveness, ignitability, chemical reactivity and/or toxicity. A hazardous waste may possess one or all of the above hazard characteristics.

The limited funds available for roadways, water supply, sewage disposal and other services required to enhance the quality of life, has historically resulted in many Canadian jurisdictions treating hazardous waste as everyday garbage. Without special facilities for collection, transport, handling or disposal there are few alternatives. The adverse health impacts and environmental consequences associated with the improper management and disposal of hazardous waste, was not appreciated until recently. Consequently, hazardous waste has in some jurisdictions:

- contaminated groundwater via leachate;
- contaminated surface water via runoff;
- contributed to air pollution via open burning, evaporation, sublimination or wind erosion;
- contaminated soils;
- resulted in poisoning via direct contact;

- resulted in poisoning via the food chain; and
- resulted in fires and explosions.

Figure 1-1 illustrates the impact of hazardous waste improperly deposited in the environment.

Remedial action at contaminated sites can become an expensive proposition. In Alberta, remedial action at contaminated sites has cost between $15,000 and $10,000,000. The Sydney tar pond clean up in Nova Scotia, is currently estimated to cost $60,000,000. The Expo site in Vancouver has the potential to become the most expensive in Canadian history.

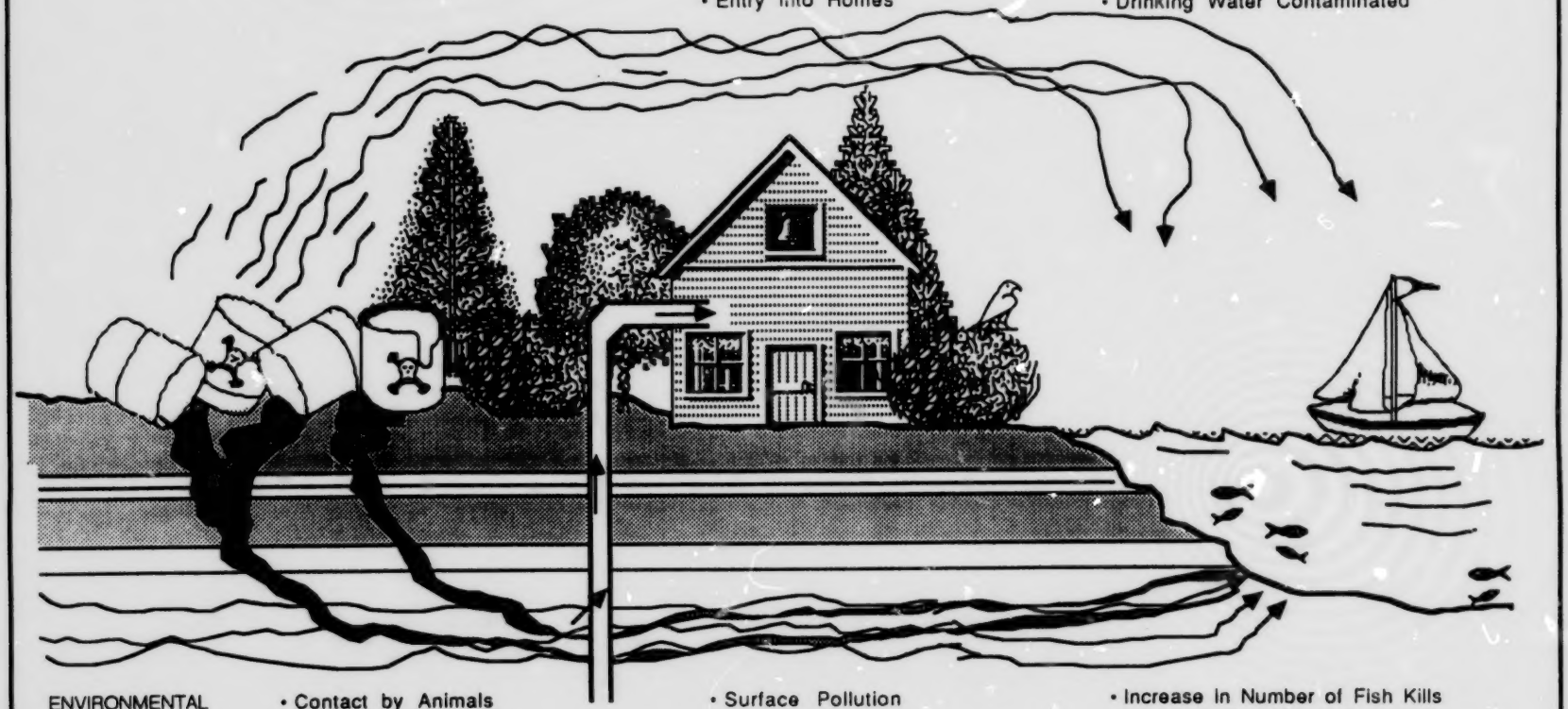
As a result of the problems caused by hazardous waste, most Canadian jurisdictions have made proper hazardous waste management a priority.

## 1.2 STUDY BACKGROUND

The Yukon Government has recognized the importance of proper hazardous waste management. In the throne speech delivered by the Government on January 10, 1989, it was noted that "hazardous industrial waste ... are problems we associate with the South, not the North, but they have come North, and we must face them."

One of the problems that may have been referred to in the throne speech, was the discovery of PCB contaminated soil in the Granger subdivision of Whitehorse. A site assessment undertaken in September 1989, revealed that there are 125 $m^3$ of contaminated soils that need to be addressed. A remedial action program is proposed for 1990.

FIGURE 1-1
IMPACT OF HAZARDOUS WASTE DEPOSITED IN THE ENVIRONMENT


PUBLIC HEALTH EFFECTS
DUMPS
• Polluted Air
• Food Chain Contaminated
GROUNDWATER
• Drinking Water Contaminated
• Entry Into Homes
SURFACE WATER SEDIMENTS
• Contaminated Fish and Animal Life Consumed
• Drinking Water Contaminated
ENVIRONMENTAL EFFECTS
• Contact by Animals
• Vegetation Loss
• Air Pollution
• Groundwater Pollution
• Land Pollution
• Surface Pollution
• Increase in Number of Fish Kills Possibly Resulting in Decreased Survival of Fish Populations
• Decreased Survival and Reproductive Ability of Birds and Animals Consuming Contaminated Aquatic Life
• Affect Algae and Other Lower Forms of Life and thus Affect Food Chain and Entire Eco-system

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A second site in Whitehorse, just north of Two Mile Hill, is contaminated with what appears to be oil. This site is referred to as the Whitehorse tar pit and is slated to be assessed in 1990.

Concern about contaminated sites may not be restricted to the Whitehorse area. The Department of Indian and Northern Affairs has a list of approximately 300 sites across the Yukon, that may be contaminated. These sites have yet to be assessed.

The problems posed by contaminated sites in the Yukon, may have been avoided if waste management programs had been in place that recognized the adverse impacts associated with hazardous wastes. Waste management programs could have regulated waste as it moved from point of generation through to disposal.

The first step in the development of a management program is a waste inventory and characterization study. Cognizance of waste amounts, types and sources is a necessary pre-condition to understanding the nature and dimensions of a hazardous waste problem and planning solutions to it.

## 1.3 SCOPE OF WORK

The purpose of this report is to characterize the types, quantities and distribution of hazardous waste that are in place or are being generated in the Yukon and to document the existing disposal methods for these wastes.

Specific report objectives are:

- to identify hazardous waste amounts, types and sources generated on an annual basis;
- to identify hazardous waste amounts, types and sources that are generated on a non routine basis;
- to identify hazardous waste amounts and types that are in storage;
- to identify current treatment and disposal methods utilized;
- to develop a computer database for the hazardous waste inventory;
- to identify specific concerns related to development of a hazardous waste program in the Yukon;
- to discuss a regulatory definition of hazardous waste;
- to provide preliminary data on quantitative requirements for storage and disposal of hazardous wastes; and
- to prioritize hazardous waste management activities.

## 1.4 EXCLUSIONS

The primary focus of this report is to identify hazardous wastes that are not being regulated or disposed of in an appropriate manner. There are certain waste types that have been excluded from

consideration in this study because they are presently legislated and controlled, or they are beyond the scope of the project. These wastes include:

- o non-hazardous wastes which are treatable by existing facilities and discharge effluents acceptable to regulatory agencies;
- o chemical toilet wastes;
- o drilling fluids;
- o mine tailings; and
- o radioactive waste.

Chemical toilet waste is currently addressed by the Yukon Public Health Act. Under this Act, Camp Sanitation Regulations and Private Sewage Disposal Systems Regulations have been passed.

Mine tailings and drilling fluids are addressed primarily by Federal legislation including:

- o Arctic Waters Pollution Prevention Act;
- o Canadian Environmental Protection Act;
- o Environmental Contaminants Act;
- o Fisheries Act;
- o Northern Inland Waters Act; and
- o Territorial Lands Act.

Radioactive waste is traditionally not included in hazardous waste studies because of the type of hazard they pose. Radioactivity is considered a hazard that merits its own classification. The Atomic Energy Control Act addresses radioactive wastes.

## 1.5 REPORT AUTHORIZATION

This report has been commissioned by the Department of Community and Transportation Services of the Yukon Territory. The report meets the stated objectives and provides sufficient information for officials to initiate a proactive hazardous waste management strategy for the Yukon Territory.

# PART 2

# PROJECT APPROACH

PART 2 - PROJECT APPROACH

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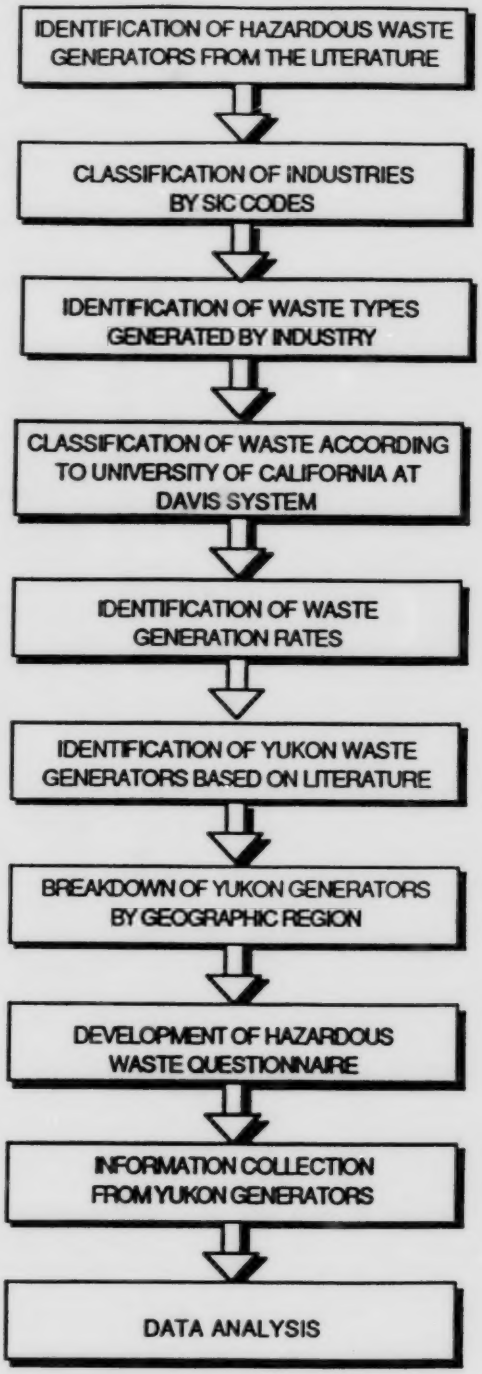
## 2.1 INTRODUCTION

To estimate hazardous waste generation in the Yukon, two distinct methods were utilized in this report. In the first method, hazardous waste data was obtained via interviews with generators, transporters, disposal firms and regulatory agencies with the exception of household hazardous waste generators. In the second method, the literature was reviewed and an estimate of waste amounts and types that should be expected from Yukon generators was derived. These two totals were compared and a range of waste amounts and types that should be expected was compiled.

This part of the report describes in detail the methods used to compile information for the study. A building block approach was utilized, with information collected in one step serving to focus work efforts in subsequent steps. Figure 2-1 illustrates the project methodology.

## 2.2 IDENTIFICATION OF HAZARDOUS WASTE GENERATORS FROM THE LITERATURE

The initial step in the Yukon waste inventory was to identify those industry types with the greatest potential for generating hazardous waste. A literature review of experience in other jurisdictions was conducted, utilizing the resources of the Monenco library. On line computer search capabilities allowed the project team to access United States and Canadian databases. In addition, Monenco personnel reviewed hazardous waste inventories undertaken in the following jurisdictions:


IDENTIFICATION OF HAZARDOUS WASTE GENERATORS FROM THE LITERATURE
CLASSIFICATION OF INDUSTRIES BY SIC CODES
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DEVELOPMENT OF HAZARDOUS WASTE QUESTIONNAIRE
INFORMATION COLLECTION FROM YUKON GENERATORS
DATA ANALYSIS

**FIGURE 2-1**
**HAZARDOUS WASTE**
**INVENTORY METHODOLOGY**

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- o Yukon;
- o Northwest Territories;
- o Northern and Western Canada;
- o Alberta;
- o Manitoba;
- o Quebec;
- o Vancouver;
- o United States;
- o Idaho; and
- o New York State.

Appendix A contains a complete list of literature reviewed.

A master list was compiled summarizing the literature review information with respect to:

- o generic industry types generating hazardous waste;
- o waste types generated on an annual basis;
- o waste amounts generated on a non routine basis; and
- o household hazardous waste generation.

## 2.3 INDUSTRY CLASSIFICATION SYSTEM

The generic industry types on the master list, were then grouped together according to their activities or goods handled and produced. This was achieved utilizing their Standard Industrial Classification (SIC) code. Appendix B summarizes the SIC code system.

An SIC code can consist of up to four digits depending on the detail of the categorization. The first two digits identify broad industrial categories (eg. SIC 55 - Auto Dealers and Service Stations). The last two digits identify specific industry types within the broad categories (eg. 5541 - Gasoline Service Stations).

The SIC code system was used in this study because:

- it has been utilized with success for hazardous waste inventory purposes in other jurisdictions; and
- it provides a framework for the classification of Yukon hazardous waste generators.

Yukon households are potential hazardous waste generators, however the SIC classification system does not account for them. For the purposes of this report, Yukon households have been assigned SIC 99.

## 2.4 WASTE CLASSIFICATION SYSTEM

Each of the industries identified in Section 2.2 was found to generate at least one and sometimes many hazardous waste types. A classification system was required to standardize the data from the many reports reviewed. The waste classification system utilized in this study was based on the University of California at Davis (UCD) Waste Classification System. The UCD system was recently utilized in Manitoba with success. The UCD classification was chosen because:

- it was an established classification system shown to work in other jurisdictions;

- specific waste types can be identified;

- it was flexible enough to allow addition or subtraction of waste types;

- it provided a framework for the classification of Yukon generated hazardous waste; and

- the UCD waste types can be consolidated into 14 waste streams that are compatible for treatment/disposal.

Appendix C presents the UCD classification system. In Table C-1 the UCD classification system assigns a two digit UCD code to a broad category of waste (example: UCD 11 - acid solutions). This broad category of waste can then be refined into specific waste types as denoted by a three digit UCD code (example: UCD 111 - acidic solutions with heavy metals). All waste types identified in the literature review were assigned a UCD code.

To identify hazardous waste management options, the UCD classification system was then consolidated into 14 waste streams (Table C-2). This is referred to as the Consolidated University of California at Davis system (CUCD). The consolidated waste streams reflect compatible wastes for treatment/disposal purposes. The purpose of the CUCD was to present the data in a format that will focus future management efforts.

## 2.5 WASTE GENERATION ESTIMATES FROM THE LITERATURE

The literature (as described in Section 2.2) revealed a number of methods to estimate the amount of hazardous waste generated by industry. They were:

- o rate data;
- o permit data;
- o disposal data;
- o transport data; and
- o industry survey.

The rate data method used waste generation information available in the literature. The data was expressed as a ratio of waste generated per employee or some other industry indicator. The rate data was then matched with industry statistics in a region to provide generation estimates. In the case of household hazardous wastes, a waste generation rate per household was determined.

The permit data method assumed that waste generating industries maintain records of waste stream types and amounts generated, and report this information to regulatory agencies. These reports were used to develop generation rates.

The transport and disposal rate methods relied on the availability of information from manifest forms utilized by the transport and disposal industry.

The industry survey methods referred to direct contact with representative industries to obtain waste generation data.

All of the different rates available from the literature, for each specific waste type, were recorded on the master list of

waste types. A representative waste generation rate was derived for industry waste types having more than one rate identified in the literature. These rates formed the basis of estimating the theoretical amount of waste generated in the Yukon. Where literature estimates were not available for specific industries, then the reported rate was utilized.

## 2.6 IDENTIFICATION OF YUKON WASTE GENERATORS

Once the master list of generic hazardous waste generators was compiled, the next step was to identify Yukon specific generators. Five primary sources were accessed to develop the Yukon list of generators:

- Dun and Bradstreet Industry Search (updated to 1989);
- 1988 Yukon Business Directory;
- 1986-87 Yukon Data Book;
- 1988 Northern British Columbia and Yukon Telephone Directory; and
- Environment Canada - Master List of Hazardous Waste Generators.

Every Yukon industry/company listed in the above sources, was compared against the master list of potential waste generators from the literature. A list of Yukon firms potentially generating hazardous waste, by their two digit SIC code was compiled.

The draft list of potential hazardous waste generators was then sent to the Department of Community and Transportation Services for review. The purpose of the review step was to ensure that no major generators had been omitted. Additions and deletions to the Yukon list of generators were made based on Department of Community and Transportation Services input.

## 2.7 GEOGRAPHIC DISTRIBUTION OF YUKON GENERATORS

The list of potential generators of hazardous waste in the Yukon was then divided according to geographical location. The Yukon was divided into four geographic regions based on input received from the Department of Community and Transportation Services. Figure 2-2 illustrates the four regions. The major population centres were classified into the following regions:

| | |
|---|---|
| Northern Region | o Dawson City |
| | o Elsa |
| | o Mayo |
| | o Old Crow |
| | o Pelly Crossing |
| | o Stewart Crossing |
| Eastern Region | o Carmacks |
| | o Faro |
| | o Ross River |
| | o Teslin |
| | o Upper Liard |
| | o Watson Lake |

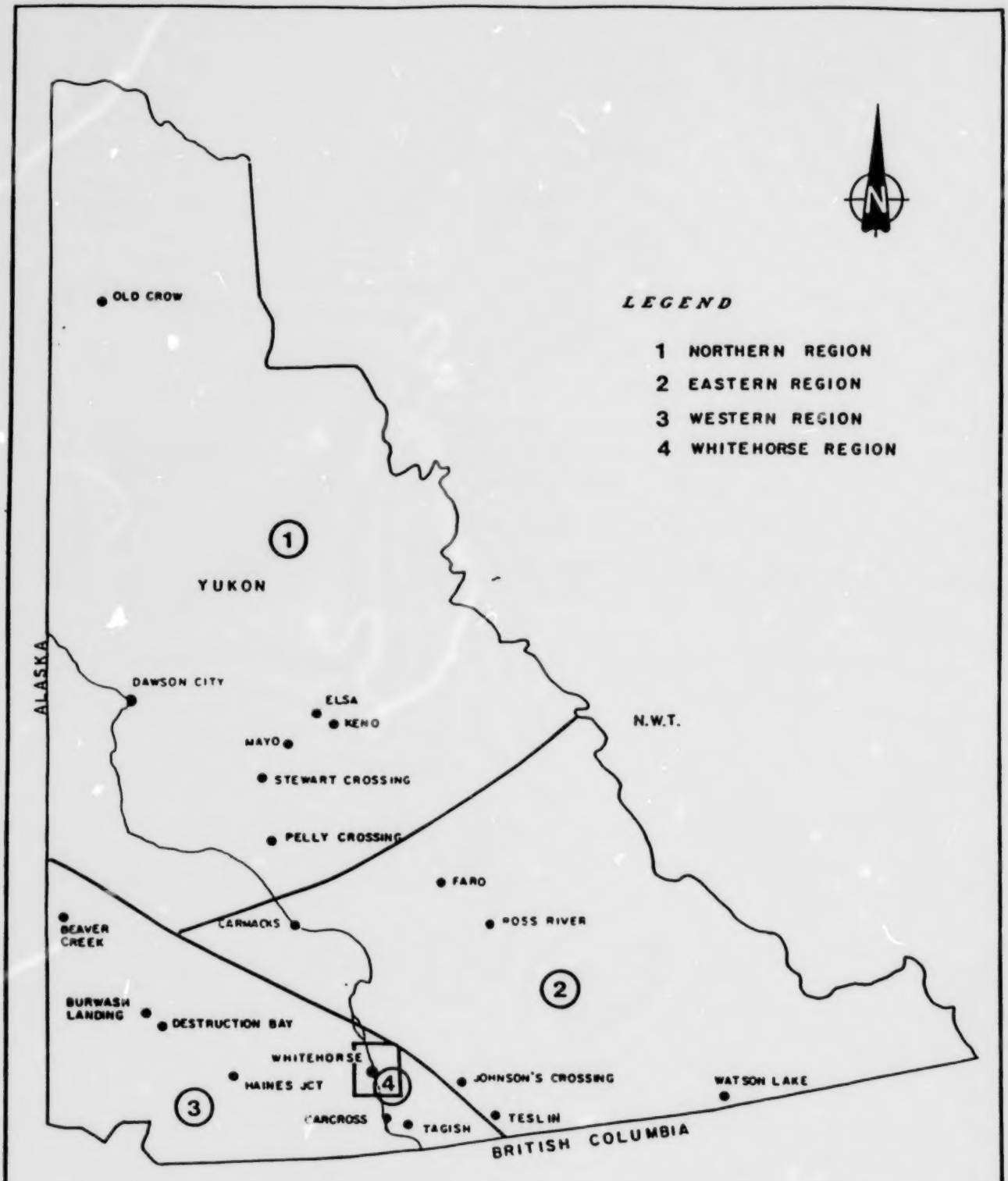


FIGURE 2-2
GEOGRAPHICAL REGIONS

| | |
|---|---|
| Western Region | o Beaver Creek |
| | o Burwash Landing |
| | o Carcross |
| | o Destruction Bay |
| | o Haines Junction |
| Whitehorse Region | o Whitehorse |

In the case of household hazardous wastes, the population of each of the four regions was divided by 2.8 people (average number of people in a household), to determine the number of households in each region. Population data was obtained from the Statistics Branch of the Yukon Territory Government.

## 2.8 QUESTIONNAIRE DEVELOPMENT

In order to obtain valid, representative and complete information from Yukon industries, a comprehensive questionnaire was developed. The questionnaire was based on questionnaires used in other jurisdictions (eg. Alberta) and applying the experience of Monenco personnel gained from similar studies.

The questionnaire consisted of a number of sections. The first section requests general background information about the firm such as company name and location. In the second section, information concerning waste characteristics, amounts and sources was solicited. Also in the second section, information regarding hazardous waste in storage and disposal practices utilized was requested.

In the final section information regarding the companies market share was requested. This section identified how large a

company was within its own field of endeavour and served to indicate which companies were the major generators.

## 2.9 HAZARDOUS WASTE INFORMATION COLLECTION

The method for selecting which Yukon companies to inventory, within each two digit SIC category, was based on:

- o size; and
- o geography.

The largest companies within each SIC category were contacted regardless of where they were located. Smaller firms, in geographic regions other than where the major generators within their SIC were located, were also contacted to obtain their generation information. This approach ensured that a complete understanding of waste practices for each SIC was obtained.

Data collection was undertaken primarily by telephone.

The telephone approach was selected because:

- o high survey response results could be obtained;
- o many companies could be surveyed in a short period of time; and
- o adequate information was obtained without the high costs associated with site visits.

During the telephone interview, a brief description of the purpose of the inventory was given and it was explained that the

information would form the data base for an effective hazardous waste management program. The companies contacted were also informed that no company names would appear in the report, just SIC codes. An assurance of confidentiality and anonymity to companies in other jurisdictions, has been shown to improve the quantity and quality of the inventory responses.

Some companies were FAX'ed questionnaires if they asked for them. These questionnaires were returned by mail.

A site visit was made by Monenco project personnel to Whitehorse in November, 1989 to follow up and verify selected questionnaire responses. Interviews were held with generators, transporters, disposal firms and regulatory agencies to confirm data collected.

During the Whitehorse visit, special emphasis was placed on verifying:

- o waste in storage;
- o non routine waste; and
- o waste transported through the Yukon from other jurisdictions.

## 2.10 DATA ANALYSIS

The data collected from the literature and waste generators was summarized by CUCD waste stream. Within each of the 14 CUCD waste streams:

- SIC codes contributing to waste generation were identified;
- the Yukon specific generation values were determined; and
- an estimate of the amount of waste that should be expected (from the literature review) was recorded.

Based on the hazardous waste inventory information collected, recommendations were made for the initiation of a Yukon management strategy.

## 2.11 INVENTORY LIMITATIONS

The inventory information presented in Parts 3 and 4 will provide a reasonable quantitative and qualitative description of hazardous wastes and their disposal practices in the Yukon. However, experience in other jurisdictions has shown there are limitations inherent in preparing a statistically valid waste inventory. The major limitations contributing to uncertainty include:

a) the reluctance of generators to provide data even when data is available;

b) the lack of company knowledge regarding waste types they generate;

c) concentration of hazardous waste is typically not known by generators;

d) the consistent classification of waste with multiple constituents is difficult;

e) data available on industry types, sizes, waste streams, locations and waste generation rates is often general and any inaccuracies may be magnified in an inventory;

f) rate data for homogeneous industries are reasonable estimates whereas other industries are quite diverse and therefore rate data could be inaccurate; and

g) a high degree of seasonal employment in some industries can contribute to inaccurate waste estimates when presented on an annual basis.

Consequently, the Yukon inventory data presented must be viewed as a management tool that indicates an order of magnitude. This level of accuracy is sufficient to allow for management option planning.

# PART 3

# RESULTS

PART 3 - RESULTS

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## 3.1 INTRODUCTION

The inventory of hazardous wastes in the Yukon revealed that there are:

- a large number of companies that generate hazardous waste on an annual basis;
- collectors and haulers who transport hazardous waste within or through the Territory; and
- storage, treatment and disposal facilities utilized, that may not be environmentally sound.

This part of the report details the inventory findings.

## 3.2 POTENTIAL HAZARDOUS WASTE GENERATORS

The literature review of hazardous waste inventories, identified a diverse number of industries potentially generating hazardous waste. Table 3-1 identifies the two digit SIC codes for these industries. Table 3-1 was utilized to focus efforts on identifying specific Yukon generators of hazardous waste.

## 3.3 YUKON HAZARDOUS WASTE GENERATORS

Information garnered from Dun and Bradstreet, the Yukon Business Directory and other sources indicated that there are over 1,500 companies active in the Yukon. Of the over 1,500 identified,

TABLE 3-1

Hazardous Waste Generators Identified
by SIC Classification Number

| | |
|---|---|
| 07 | Agricultural Services |
| 10 | Metal Mining |
| 16 | Heavy Construction Contractors |
| 17 | Special Trade Contractors |
| 24 | Lumber and Lumber Products |
| 27 | Printing and Publishing |
| 28 | Chemicals and Allied Products |
| 31 | Leather and Leather Products |
| 32 | Stone, Clay, Glass and Concrete Products |
| 34 | Fabricated Metal Products |
| 39 | Miscellaneous Manufacturing Industries |
| 41 | Local Transport |
| 42 | Trucking and Warehousing |
| 45 | Transportation by Air |
| 48 | Communications |
| 49 | Electric, Gas and Sanitary Services |
| 50 | Durable Goods |
| 51 | Non-Durable Goods |
| 55 | Auto Dealers and Service Stations |
| 59 | Miscellaneous Retail Stores |
| 72 | Personal Services |
| 73 | Business Services |
| 75 | Automotive Repair |
| 80 | Health Services |
| 82 | Educational Services |
| 91 | Federal Government Departments |
| 92 | Territorial Government Departments |
| 93 | Municipal Governments |
| 99 | Yukon Households |

there are 388 companies that could be potential hazardous waste generators. Table 3-2 provides a breakdown of the 388 firms by SIC code.

SIC 17 Special Trade Contractors with a total of 43 firms, is the category with the largest number of potential generators. SIC 75 Automotive Repair Shops follows closely behind with 37 active companies in the Territory.

## 3.4 SURVEY RESULTS

Of the 388 companies identified as potential generators, 213 were contacted during this study. Table 3-2 summarizes the response results. Overall survey response was 55%. The 55% rate is higher than most inventories undertaken in other jurisdictions. The response rate in other jurisdictions averages 30%.

The percentage of Yukon companies contacted ranged from eight percent to 100 percent. The eight percent contact rate was in SIC 82 Educational Services, and reflects one key individual being able to provide information on all 13 firms (schools). In nine SIC codes a 100 percent response rate was achieved because only a small number of companies had to be contacted.

## 3.5 WASTE TYPES GENERATED

Yukon firms responding to the survey, identified 54 different hazardous waste types generated. Table 3-3 identifies the waste types reported by their UCD waste classification number.

TABLE 3-2

Inventory Survey Results

| SIC Number | | Number of Companies (Potential Generators) | Number Contacted | % Contacted |
|---|---|---|---|---|
| 07 | Agricultural Services | 15 | 10 | 67 |
| 10 | Metal Mining | 31 | 14 | 45 |
| 16 | Heavy Construction Contractors | 24 | 11 | 46 |
| 17 | Special Trade Contractors | 43 | 20 | 47 |
| 24 | Lumber and Lumber Products | 6 | 2 | 33 |
| 27 | Printing and Publishing | 17 | 11 | 65 |
| 28 | Chemicals and Allied Products | 6 | 4 | 67 |
| 31 | Leather and Leather Products | 2 | 2 | 100 |
| 32 | Stone, Clay, Glass and Concrete Products | 6 | 6 | 100 |
| 34 | Fabricated Metal Products | 2 | 2 | 100 |
| 39 | Miscellaneous Manufacturing Industries | 7 | 7 | 100 |
| 41 | Local Transport | 5 | 5 | 100 |
| 42 | Trucking and Warehousing | 17 | 4 | 24 |
| 45 | Transportation by Air | 12 | 8 | 67 |
| 48 | Communications | 2 | 2 | 100 |
| 49 | Electric, Gas and Sanitary Services | 5 | 5 | 100 |
| 50 | Durable Goods | 6 | 5 | 83 |
| 51 | Non-Durable Goods | 11 | 8 | 73 |
| 55 | Auto Dealers and Service Stations | 31 | 12 | 39 |
| 59 | Miscellaneous Retail Stores | 5 | 5 | 100 |
| 72 | Personal Services | 29 | 8 | 28 |
| 73 | Business Services | 12 | 9 | 75 |
| 75 | Automotive Repair | 37 | 20 | 54 |
| 80 | Health Services | 27 | 22 | 81 |
| 82 | Educational Services | 13 | 1 * | 8 |
| 91 | Federal Government Departments | 5 | 4 | 80 |
| 92 | Territorial Government Departments | 4 | 4 | 100 |
| 93 | Municipal Governments | 8 ** | 2 | 25 |
| 99 | Yukon Households | NA | NA | NA |
| | | 388 | 213 | 55 |

* Contact made was able to provide information on all 13 education services identified.

** Incorporated (Carmacks, Dawson, Faro, Haines Junction, Mayo, Teslin, Watson Lake, Whitehorse)

NA Not Applicable

TABLE 3-3

Summary of Yukon Hazardous Waste Types Identified
Using UCD Waste Classification System

| | |
|---|---|
| 11 | Acidic Solutions |
| | 112 Acid Solution with Other Metals and Non-Metals |
| | 113 Other Acidic Solution |
| 12 | Alkaline Solutions |
| | 121 Alkaline Solutions with Heavy Metals |
| | 122 Alkaline Solutions with Other Metals |
| | 123 Other Alkaline Solutions |
| 13 | Metal Finishing Solutions |
| | 132 Metal Finishing Solutions, Alkaline |
| | 133 Spent Pickle Liquor |
| 14 | Other Aqueous Solutions |
| | 141 Aqueous Solutions |
| | 144 Antifreeze |
| | 145 Brine |
| | 146 Solutions containing cyanide |
| | 147 Solutions containing sulfides |
| 15 | Inorganic Solids |
| | 151 Inorganic Solids (silicon tubes) |
| | 152 Inorganic Solid Chemicals |
| 16 | Other Inorganic Wastes |
| | 161 Asbestos - containing wastes |
| | 162 Aluminum and tin wastes |
| 211 | Spent Solvents |
| | 211 Halogenated Solvents with Heavy Metals |
| | 212 Halogenated Solvents with Other Metals |
| | 215 Non-Halogenated Solvents with Other Metals |
| | 216 Other Non-Halogenated Solvents (Varsol) |
| 22 | Other Organic Liquids |
| | 222 Organic Liquids with Halogens Only |
| | 224 Other Organic Liquids |
| | 225 Aqueous Solution with Non-Halogenated Residues Less than 10% |

TABLE 3-3 (Cont'd)

Summary of Yukon Hazardous Waste Types Identified
Using UCD Waste Classification System

| | | |
|---|---|---|
| 24-25 | | Other Organic Wastes |
| | 242 | PCB Oils and High Strength Liquids |
| | 243 | Pharmaceuticals and Wastes |
| | 244 | Photochemical Waste |
| | 251 | Tannery Wastes - Liquid |
| | 252 | Solid or Sludge Tannery Wastes |
| | 254 | Adhesives or Glue |
| | 258 | Waste Tar and Residues |
| 26 | | Polymeric Material Wastes |
| | 261 | Polymeric Resins |
| | 262 | Latex Wastes |
| | 263 | Other Polymeric Wastes |
| 28 | | Oily Wastes |
| | 281 | Waste Oil and Mixed Oil |
| | 283 | Oily Mud, Sediment and Water |
| | 286 | Oil/Water Separator Sludge |
| | 289 | Oily Wastes with Water |
| | * 290 | Oil Filters |
| 41 | | Relatively Inert Sludges |
| | 416 | Ink Sludge |
| 43 | | Metal Sludge |
| | 431 | Liquid Mercury |
| 44-45 | | Other Sludges |
| | 441 | Lime Sludges |
| | 447 | Tetraethyl Lead Sludge |
| | 454 | Paint Sludge |
| 50-53 | | Miscellaneous |
| | 512 | Spill Cleanup |
| | 513 | Laboratory Waste Chemicals |
| | 514 | Contaminated oil and sand |
| | 519 | Fly Ash and Retort Ash |
| | 521 | Spent Cartridge Filters |
| | 525 | Metal dust and machining wastes |
| | 528 | Pathogenic Wastes |
| | 531 | Contaminated Rags |
| | 532 | Equipment and/or Containers with Pesticides |
| | 533 | Contaminated equipment and containers (sharps) |
| | * 534 | Vehicle batteries |

* New categories added to conform with waste types identified.

The 54 waste types were grouped into 14 CUCD waste streams. The CUCD waste streams represent waste types having common physical and chemical characteristics. Table 3-4 identifies the 14 CUCD categories and the Yukon waste types within each category.

## 3.6 WASTE STREAM ANALYSIS

To ensure that all hazardous wastes were accounted for in the Yukon, the survey focussed on:

- annual hazardous waste generation;
- hazardous waste in storage; and
- hazardous waste generated on a non-routine basis.

The following sections describe the survey findings.

### 361 ANNUAL WASTE GENERATION

Table 3-5 summarizes the amount of hazardous waste generated in the Yukon, on an annual basis, by CUCD waste stream. Table 3-5 presents two waste generation estimates. The first estimate was based on survey response results obtained from the 213 companies contacted and extrapolated to reflect all 388 potential generators in the Yukon. The second estimate was based on information obtained from the literature.

The two waste estimates appear to confirm that hazardous waste generation in the Yukon is in the order of 1000 to 1300 tonnes per year.

TABLE 3-4

Waste Types Categorized According to Waste Streams

| Consolidated UCD Waste Stream | UCD Codes |
|---|---|
| Organic Sludges and Still Bottoms (no oil) | 252, 261, 263 |
| Solvents and Organic Solutions | 211, 212, 215, 216, 222, 224, 521 |
| Oil and Greases | 281, 290, 531 |
| Oil/Water Mixtures | 283 |
| Organic and Oily Residues | 258, 263, 286, 289, 447 |
| Heavy Metal Solutions and Residuals | 112, 121, 122, 132, 133, 141, 251, 431 |
| Misellaneous Chemicals and Products | 113, 123, 145, 152, 161, 243, 244, 416, 513, 528, 533, 534 |
| Paint and Organic Residuals | 254, 262, 454 |
| Aqueous Solutions with Organics | 144, 225 |
| Anion Complexes | 146, 147 |
| Sludges and Inorganic Resuduals | 151, 162, 441, 519, 525 |
| Pesticides and Herbicide Wastes | 224, 532 |
| PCB Wastes | 242 |
| Cleanup Residuals | 512, 531, 533 |

TABLE 3-5
Annual Waste Generation Summary

| Waste Stream | Annual Generation (kg/yr) Survey Estimate | Annual Generation (kg/yr) Literature Estimate |
|---|---|---|
| Organic Sludges and Still Bottoms (no oil) | 648 | 991 |
| Solvent and Organic Solutions | 27,866 | 33,698 |
| Oils and Greases | 683,380 | 745,635 |
| Oil/Water Mixture | 840 | 1,817 |
| Organic and Oily Residues | 62,319 | 118,668 |
| Heavy Metal Solutions and Residuals | 16,352 | 64,089 |
| Miscellaneous Chemicals and Products | 110,072 | 124,681 |
| Paint and Organic Residuals | 3,741 | 17,719 |
| Aqueous Solutions with Organics | 6,792 | 6,792 |
| Anion Complexes | 76 | 76 |
| Sludges and Inorganic Residuals | 84,900 | 84,935 |
| Pesticides and Herbicide Wastes | 1,170 | 1,387 |
| PCB Wastes | N/A [1] | N/A [1] |
| Clean-up Residuals | 2,958 | 2,958 |
| Household Hazardous Waste | N/A [2] | N/A [2] |
| TOTAL | 1,001,114 | 1,203,446 |

N/A[1] - Not Applicable due to federal initiative that will attempt to phase out PCB's in use by 1993. Consequently, they are not considered to be generated annually and are covered in the non routine waste section.

N/A[2] - Not Applicable. Household wastes have been addressed in a separate section of this report (See Section 3.7).

Note: For some waste streams (Aqueous Solutions with Organics, Anion Complexes, Cleanup Residuals) the survey estimate has been used in the literature estimate column. This approach has been taken because literature estimates either were not available for the waste streams or the literature estimate was lower. If the literature estimate was lower than the survey result, the survey result was assumed to be more accurate because people don't usually overestimate their waste.

The following sections describe each waste stream in detail.

.1 Organic Sludges and Still Bottoms

The inventory survey identified three industry types that generated waste in this category (Table 3-6). The chemical manufacturing industry is typically a large producer of organic sludges and still bottoms, however this type of industry is not common in the Yukon. There were only 22 employees identified through the survey as being employed in this area.

The leather tanning industry also contributes to this waste stream. Although the actual composition of wastes may vary it is quite common for a chromium based substance to be used in the tanning process. It is probable that some leather tanning is done in private households.

A small amount of sludge was reported by the Special Trades Contractors.

All three industries reported using a landfill site for disposal of this waste stream.

.2 Solvents and Organic Solutions

Solvents have a very broad range of use and were reported by 17 different SIC codes (Table 3-7). Metal mining companies were the highest volume generators.

Disposal of these hazardous wastes was:

- via landfill near company property; or

TABLE 3-6

Organic Sludges and Still Bottoms

| SIC | Industry | Reported Value (kg/yr) | Literature Estimate (kg/yr) |
|---|---|---|---|
| 17 | Special Trade Contractors | 24 | 24 [1] |
| 28 | Chemicals and Allied Products | 408 | 154 |
| 31 | Leather and Leather Products | 216 | 813 |
| | Total | 648 | 991 |

[1] No literature estimates available therefore reported values utilized.

TABLE 3-7

Solvents and Organic Solutions

| SIC | Industry | Reported Value (kg/yr) | Literature Estimate (kg/yr) |
|---|---|---|---|
| 10 | Metal Mining | 9,084 | 9,084 [2] |
| 16 | Heavy Construction Contractors | 1,814 | 2,016 |
| 17 | Special Trade Contractors | 2,801 | 3,612 |
| 27 | Printing and Publishing | 1,596 | 2,312 |
| 28 | Chemicals and Allied Products | 12 | 762 |
| 41 | Local Transport | 667 | 737 |
| 42 | Trucking and Warehousing | 1,882 | 1,960 |
| 45 | Transportation by Air | 2,844 | 2,844 [1] |
| 48 | Communications | 1,368 | 1,368 [2] |
| 49 | Electric, Gas and Sanitary Services | 612 | 612 [2] |
| 50 | Durable Goods | 1,908 | 2,502 |
| 55 | Auto Dealers and Service Stations | 808 | 2,159 |
| 72 | Personal Services | 288 | 560 |
| 75 | Automotive Repair | 1,923 | 2,863 |
| 82 | Educational Services | 2 | 50 |
| 91 | Federal Government | 120 | 120 [2] |
| 92 | Territorial Government | 137 | 137 [2] |
| | Total | 27,866 | 33,698 |

[1] All literature values found were lower than reported value, therefore the actual reported value was used in its place. This approach was taken because people do not usually overestimate their waste, consequently, a more accurate estimate of upper limit generation should be obtained.

[2] No literature estimates available therefore reported values utilized.

- o mixed with waste oil and either burned for heating or used for dust suppression.

Some companies indicated that they stored these materials on site.

.3 Oils and Greases

There were 19 industries that reported waste generation in this category (Table 3-8). The type of waste most commonly generated was waste oil or mixed oil. These include used automotive oil, hydraulic oil and cutting oils and they may contain solvents, metals or some other type of contaminant. The largest generators of these wastes were the auto repair shops, metal mines and construction contractors which generate 56% of the total quantity.

Disposal of waste oil was reported to occur by:

- o burning for heat;
- o using a landfill site; and
- o spreading on roads for dust suppression.

In one instance a firm dumped their waste oil into a tank which was made available to the public. People who wanted waste oil came with containers and filled them. Where this waste oil was taken is unknown.

The category of Oils and Greases represents 68% of the total amount of hazardous waste generated in the Yukon.

.4 Oil/Water Mixtures

There was only one industry that reported a waste that was an oil/water mixture (Table 3-9). It is likely that there are other companies with this type of waste, but they did not report it as

TABLE 3-8

Oils and Greases

| SIC | Industry | Reported Value (kg/yr) | Literature Estimate (kg/yr) |
|---|---|---|---|
| 07 | Agricultural Services | 108 | 3,000 |
| 10 | Metal Mining | 125,268 | 125,268 [2] |
| 16 | Heavy Construction Contractors | 102,060 | 102,060 [1] |
| 17 | Special Trade Contractors | 11,388 | 12,000 |
| 24 | Lumber and Lumber Products | 5,400 | 5,400 [2] |
| 34 | Fabricated Metal Products | 816 | 816 [1] |
| 41 | Local Transportation | 17,076 | 17,076 [1] |
| 42 | Trucking and Warehousing | 65,916 | 65,916 [1] |
| 45 | Transportation by Air | 25,464 | 25,464 [1] |
| 48 | Communications | 18,252 | 18,252 [2] |
| 49 | Electric, Gas and Sanitary Services | 16,000 | 16,000 [2] |
| 50 | Durable Goods | 21,456 | 21,456 [1] |
| 51 | Non-Durable Goods | 25,500 | 37,278 |
| 55 | Auto Dealers and Service Stations | 31,104 | 76,404 |
| 72 | Personal Services | 144 | 1,817 |
| 75 | Automotive Repair | 158,760 | 158,760 [1] |
| 91 | Federal Government | 2,340 | 2,340 [2] |
| 92 | Territorial Government | 54,516 | 54,516 [2] |
| 93 | Municipal Government | 1,812 | 1,812 [2] |
| | Total | 683,380 | 745,635 |

[1] All literature values found were lower than reported value, therefore the actual reported value was used in its place. This approach was taken because generators do not usually overestimate their waste, consequently, a more accurate estimate of upper limit generation should be obtained.

[2] No literature estimates available therefore reported values utilized.

TABLE 3-9

Oil/Water Mixtures

| SIC | Industry | Reported Value (kg/yr) | Literature Estimate (kg/yr) |
|---|---|---|---|
| 72 | Personal Services | 840 | 1,817 |

such. The method of disposal reported by the responding company was to drain the waste into the local sewer system.

.5 Organic and Oily Residues

The generation of organic and oily wastes was reported by 5 industries (Table 3-10). Wastes types in this category were:

- o alkaline solutions;
- o polymeric wastes;
- o waste tar and residues;
- o oil/water sludge; and
- o tetraethyl sludge.

The majority of these wastes were generated by the petroleum and automotive industries (96%). Disposal was primarily by landfill in an area designated for oils or burned for heat.

.6 Heavy Metal Solutions and Residuals

There were 10 industries that reported generating heavy metal solutions (Table 3-11). The waste types in this category were mostly solutions such as acids and alkalines that contain metals.

Disposal of these hazardous wastes was achieved via:

- o placement in mine tailings pond;
- o return to manufacturer outside of the Yukon;
- o sewer system;
- o landfill site;
- o salvage; and
- o use of regulatory agencies for storage or disposal.

TABLE 3-10

Organic and Oily Residues

| SIC | Industry | Reported Value (kg/yr) | Literature Estimate (kg/yr) |
|---|---|---|---|
| 51 | Non-Durable Goods | 32,280 | 32,300 |
| 55 | Auto Dealers and Service Stations | 12,864 | 28,007 |
| 75 | Automotive Repair | 14,448 | 55,634 |
| 91 | Federal Government | 2,724 | 2,724 [1] |
| 92 | Territorial Government | 3 | 3 [1] |
| | Total | 62,319 | 118,668 |

[1] No literature estimates available therefore actual reported values were utilized.

TABLE 3-11

Heavy Metal Solutions and Residuals

| SIC | Industry | Reported Value (kg/yr) | Literature Estimate (kg/yr) |
|---|---|---|---|
| 10 | Metal Mining | 24 | 24 [1] |
| 27 | Printing and Publishing | 1,788 | 3,109 |
| 31 | Leather and Leather Products | 6,552 | 42,672 |
| 34 | Fabricated Metal Products | 756 | 937 |
| 39 | Miscellaneous Retail Manufacturing | 14 | 47 |
| 50 | Durables | 24 | 191 |
| 73 | Business Services | 6,624 | 6,903 |
| 80 | Health Services | 156 | 9,541 |
| 82 | Educational Services | 204 | 455 |
| 92 | Territorial Government | 210 | 210 [1] |
| | Total | 16,352 | 64,089 |

[1] No literature estimates available therefore actual reported values were utilized.

.7 Miscellaneous Chemicals and Products

There were 20 industries that reported generating miscellaneous chemicals (Table 3-12). Typical waste types in this category were:

- o pathological wastes;
- o photochemical wastes;
- o asbestos wastes;
- o pharmaceutical wastes;
- o ink sludge;
- o laboratory waste chemicals;
- o waste vehicle batteries; and
- o explosives.

The Health Services industry reported the highest quantity of waste in this category.

Some of the disposal methods reported were:

- o incineration;
- o sewer system;
- o landfill;
- o tailings pond; and
- o sent out of the Yukon for disposal.

.8 Paint and Organic Residuals

A total of 12 industries reported waste generation in this category (Table 3-13). Most industries were probably generating paint waste, but did not see it as significant enough to report. The waste types in this category were:

- o adhesives or glue;

TABLE 3-12

Miscellaneous Chemicals and Products

| SIC | Industry | Reported Value (kg/yr) | Literature Estimate (kg/yr) |
|---|---|---|---|
| 07 | Agricultural Services | 12 | 33 |
| 10 | Metal Mining | 9,720 | 9,720 [2] |
| 17 | Special Trade Contractors | 612 | 612 [2] |
| 27 | Printing an Publishing | 1,728 | 4,296 |
| 28 | Chemicals and Allied Products | 24 | 126 |
| 34 | Fabricated Metal Products | 18 | 18 [2] |
| 41 | Local Transportation | 18 | 187 |
| 42 | Trucking and Warehousing | 164 | 1,052 |
| 45 | Transportation by Air | 80 | 187 |
| 48 | Communications | 504 | 504 [2] |
| 50 | Durables | 108 | 108 [2] |
| 55 | Auto Dealers and Service Stations | 988 | 11,250 |
| 59 | Miscellaneous Retail Manufacturing | 12 | 12 [2] |
| 72 | Personal Services | 7,440 | 7,440 [2] |
| 73 | Business Services | 41 | 41 [2] |
| 75 | Automotive Repair | 2,643 | 3,135 |
| 80 | Health Services | 85,320 | 85,320 [1] |
| 91 | Federal Government | 540 | 540 [2] |
| 92 | Territorial Government | 60 | 60 [2] |
| 93 | Municipal Government | 40 | 40 [2] |
| | Total | 110,072 | 124,681 |

[1] All literature values found were lower than reported value, therefore the actual reported value was used in its place. This approach was taken because generators do not usually overestimate their waste, consequently, a more accurate estimate of upper limit generation should be obtained.

[2] No literature estimates available therefore reported values utilized.

TABLE 3-13

Paint and Organic Residuals

| SIC | Industry | Reported Value (kg/yr) | Literature Value (kg/yr) |
|---|---|---|---|
| 07 | Agricultural Services | 2 | 2 [1] |
| 17 | Special Trade Contractors | 384 | 384 [1] |
| 27 | Printing and Publishing | 79 | 79 [1] |
| 28 | Chemicals and Allied Products | 12 | 12 [1] |
| 32 | Stone, clay, glass and concrete products | 134 | 134 [1] |
| 42 | Trucking and Warehousing | 90 | 693 [1] |
| 45 | Transportation by Air | 2 | 2 [1] |
| 48 | Communications | 132 | 132 [1] |
| 49 | Electric, Gas and Sanitary Services | 2 | 2 [1] |
| 75 | Automotive Repair | 2,604 | 15,979 |
| 91 | Federal Government | 276 | 276 [1] |
| 92 | Territorial Government | 24 | 24 [1] |
| | Total | 3,741 | 17,719 |

[1] No literature values available therefore reported values utilized.

- o latex wastes; and
- o paint sludge.

Paint and organic residuals were directed to landfill sites for disposal.

.9 Aqueous Solutions with Organics

There were 4 industries reported in this category (Table 3-14). Types of waste included:

- o antifreeze; and
- o solutions with non-halogenated residues.

The most common method of disposal was via the sewer system.

.10 Anion Complexes

Only one industry reported waste generation in this category (Table 3-15). The waste types reported were:

- o solutions containing cyanide; and
- o solutions containing sulfides.

These solutions are quite common in the jewelery business for plating metal but are not used in large quantities. Disposal of these hazardous wastes was via the sewer system.

.11 Sludges and Inorganic Residuals

A total of 5 industries reported waste generation of sludges and inorganic residuals (Table 3-16). Waste types generated were:

TABLE 3-14

Aqueous Solutions with Organics

| SIC | Industry | Reported Value (kg/yr) | Literature Value (kg/yr) |
|---|---|---|---|
| 48 | Communications | 1,152 | 1,152 [1] |
| 75 | Automotive Repair | 5,400 | 5,400 [1] |
| 91 | Federal Government | 12 | 12 [1] |
| 93 | Municipal Government | 228 | 228 [1] |
| | Total | 6,792 | 6,792 |

[1] No literature values available therefore reported values utilized.

TABLE 3-15

Anion Complexes

| SIC | Industry | Reported Value (kg/yr) | Literature Value (kg/yr) |
|---|---|---|---|
| 39 | Miscellaneous Retail Manufacturing | 76 | 76 [1] |

[1] No literature values available therefore reported values utilized.

TABLE 3-16

Sludges and Inorganic Residuals

| SIC | Industry | Reported Value (kg/yr) | Literature Value (kg/yr) |
|---|---|---|---|
| 17 | Special Trade Contractors | 82,224 | 82,224 [1] |
| 32 | Stone, clay, glass and concrete products | 2,628 | 2,628 [1] |
| 73 | Business Services | 24 | 24 [1] |
| 82 | Educational Services | 14 | 52 |
| 92 | Territorial Government | 7 | 7 [1] |
| | Total | 84,900 | 84,935 |

[1] No literature values available therefore reported values utilized.

- o lime sludge;
- o fly ash and retort ash;
- o aluminum and tin wastes;
- o inorganic solids (Silicon tubes); and
- o metal dust and machining waste.

Landfilling was the most common method of disposal. Some of the lime sludge waste was disposed of by land application.

.12 Pesticide and Herbicide Wastes

There were two industries that reported waste generation in this category (Table 3-17). The majority of the waste was contaminated containers that were directed to landfill sites. The only other waste type reported, was the insecticide malathion which is used in mosquito control.

.13 PCB Wastes

PCB waste is not considered to be generated on an annual basis. As such it is treated as a non-routine waste and discussed in another section of the report.

.14 Cleanup Residuals

The data survey identified six industries generating this waste stream (Table 3-18). The following waste types were reported:

- o spill cleanup residues;
- o contaminated rags; and
- o contaminated equipment and containers (sharps).

TABLE 3-17

Pesticide and Herbicide Wastes

| SIC | Industry | Reported Value (kg/yr) | Literature Value (kg/yr) |
|---|---|---|---|
| 07 | Agricultural Services | 888 | 1,105 |
| 92 | Territorial Government | 282 | 282 [1] |
| | Total | 1,170 | 1,387 |

[1] No literature values available therefore reported values were utilized.

Note: The weights presented on this table include container weights.

TABLE 3-18

Cleanup Residuals

| SIC | Industry | Reported Value (kg/yr) | Literature Value (kg/yr) |
|---|---|---|---|
| 27 | Printing and Publishing | 234 | 234 [2] |
| 55 | Auto Dealers and Service Stations | 144 | 144 [2] |
| 75 | Automotive Repair | 168 | 168 [2] |
| 80 | Health Services | 1,944 | 1,944 [1] |
| 92 | Territorial Government | 12 | 12 [2] |
| 93 | Municipal Government | 456 | 456 [2] |
| | Total | 2,958 | 2,958 |

[1] All literature values found were lower than reported value, therefore the actual reported value was used in its place. This approach was taken because generators do not usually overestimate their waste, consequently, a more accurate estimate of upper level generation should be obtained.

[2] No literature estimates available therefore reported values were utilized.

The contaminated rags contained mainly waste oil and solvents and were a common waste amongst the majority of industries. Disposal was by landfill. The contaminated equipment and containers were largely reported from the Health Services sector. This waste type consisted of infectious materials, and for the most part are incinerated.

## 3.7 HOUSEHOLD HAZARDOUS WASTE

In addition to the hazardous waste generated by industry on an annual basis, there exists a large variety of hazardous substances found in the average household (Table 3-19). Chemical compounds such as those found in cleaners, cosmetics, paints and insecticides can cause potential health and environmental problems when disposed. The most common methods of disposal for these wastes in the Yukon are through a drain line (to septic system or sewage treatment) or via landfill sites.

The contribution of individual household hazardous wastes is generally small, but the cumulative effect can produce a significant level of waste. Estimates of hazardous wastes generated per household vary from 3.0 kg (Rathje, 1987) to 5.0 kg (Alberta Special Waste Management Corporation, 1989). Assuming the high end estimate of 5.0 kg/household/year and an approximate number of 10,659 households in the Yukon, a total of 53 tonnes of household hazardous wastes are generated per year (Table 3-20).

TABLE 3-19

Common Household Hazardous Wastes by Hazard Category

| Hazardous Wastes | Toxic | Flammable | Corrosive | Reactive | Persistent |
|---|---|---|---|---|---|
| Cleaning | | | | | |
| Detergents | X | | X | | |
| Window cleaner | X | | | | |
| Drain cleaner | X | | X | | |
| Oven cleaner | X | | X | | |
| Floor cleaner/wax | X | X | | | |
| Toilet bowl cleaner | X | | X | | |
| Spot remover (naphtha) | X | X | | | |
| Bleach | X | | X | X | |
| Disinfectant | X | | X | | |
| Alcohol | X | X | | X | |
| Furniture polish | X | X | | | |
| Lawn and Garden | | | | | |
| Pesticides | X | | | | X |
| Herbicides | X | | | | |
| Home Maintenance and Improvement | | | | | |
| Paints | X | X | | | |
| Paint thinner | X | X | | X | X |
| Turpentine | X | X | | | |
| Carpet-cleaning chemicals | X | X | | | |
| Pool chemicals | X | | X | X | |
| Hobby, specialty/home business | | | | | |
| Photography chemicals | X | X | X | | |
| Glue | X | | | | |
| Wood strippers | X | X | | | |
| Wood preservatives | X | X | | | |
| Wood stains/varnishes | X | X | | | |
| Automotive | | | | | |
| Brake fluid | X | X | | | |
| Motor cleaner | X | | X | | X |
| Carburetor cleaner | X | | | | |
| Antifreeze | X | | | | |
| Windshield cleaner | X | X | | | |
| Transmission fluid | X | X | | | |
| Car wax/polish | X | | | | |
| Motor oil/gasoline | X | X | | | |
| Drugs and cosmetics | | | | | |
| Hairspray | X | X | | | |
| Medications | X | | | | |
| Nail polish | X | X | | | |
| Peroxide | X | | | X | |

TABLE 3-20

Household Hazardous Waste Generation in Yukon

| Region | Population* | Number of Households** | Quantity of Household Hazardous Waste Generated Each Year (kg/yr)*** |
|---|---|---|---|
| Northern | 3,029 | 1,082 | 5,410 |
| Eastern | 4,724 | 1,687 | 8,435 |
| Western | 1,386 | 495 | 2,475 |
| Whitehorse | 20,706 | 7,395 | 36,975 |
| TOTALS | 29,845 | 10,659 | 53,295 kg/yr. |

* Population based on 1986 Census

** Based on estimate of 2.8 people per household.

*** Based on estimate of 5.0 kg hazardous waste generated per household per year.

## 3.8 NON-ROUTINE HAZARDOUS WASTES SOURCES

Sections 3.6 and 3.7 described hazardous waste generated on an annual basis from industries and households.

There are several sources of hazardous wastes that may be classified as non routine waste. Non routine waste generation, for the most part, cannot be estimated because they are generated under unique conditions. Waste types and sources that fall into this category are:

- o PCBs;
- o Spill Response Wastes;
- o Contaminated Sites; and
- o DEW Line Sites.

### 381 PCBs

PCBs are classified a non-routine waste because of federal government initiatives that have recently been announced. The objective of these initiatives is to phase out all in service PCBs by 1993. Table 3-21 summarizes the amount of inservice PCBs in the Yukon. After 1993, the generation of PCB wastes should be minimal if the timetable for phase out is followed.

### 382 SPILL RESPONSE WASTE

Hazardous products (e.g. gasoline) and to a lesser extent hazardous waste is shipped around the Yukon on a daily basis. An Environment Canada report on spill incidents in the Yukon, indicates that there are an average of 17 significant spill events occurring

TABLE 3-21

Summary of In-Service PCBs*

| Operator | Items | Quantity (kg) High** | Low*** | Unknown |
|---|---|---|---|---|
| Federal Government | Transformers | | 368 | 975 |
| | Capacitors | 23 | | 306 |
| | Ballasts | | | 647 |
| | Oil Switches | | | 22.7 |
| | Regulators | | | 191 |
| Territorial Government | Capacitors | 104 | | |
| Utility | Transformers | | 200 | |
| | Capacitors | 58 | | |
| Private | Transformers | | 30 | |
| | Capacitors | 62 | | |
| United States Air Force (DEW Line Sites) | Transformers and Capacitors | 1,479 | | |
| | Total Known PCB Quantities | 1,726 | 598 | 2,142 |

Note: NorthwesTel and YTG have not completed in-service PCB inventories.

N.A. = Not Available

* Adapted from Environmental Protection In-service PCB Inventory Yukon Branch.

** High concentration PCB is defined as greater than 10,000 parts per million.

*** Low concentration PCB is defined as 50 to 10,000 parts per million

each year. When a spill of a hazardous material occurs, spill response waste is usually generated. Since hazardous materials were involved in the spill, the spill response waste is usually hazardous and must be handled as such. Spill response waste may include:

- o contaminated liquids which cannot be recovered or reclaimed;
- o contaminated roadway;
- o contaminated soils; and
- o contaminated materials used in the cleanup such as rags, booms, barrels, etc.

The volume of spill response waste cannot be estimated on an annual basis and is therefore considered a non routine waste. To date, spill incidents have resulted in contaminated soils being stored in drums. The potential exists for a significant amount of spill response waste to be generated if a large number of spills occur in one year.

## 383 CONTAMINATED SITES

The Department of Indian and Northern Affairs has identified 300 potentially contaminated waste sites throughout the Yukon. It is probable that only a small proportion of these sites actually contain hazardous wastes that will require treatment and disposal. It is currently impossible to estimate how much waste or contaminated material will be generated from these sites until site assessment work is completed.

There are three well known contaminated sites in the Whitehorse Region (Table 3-22). Two of the sites have been contaminated with PCBs. The PCB contaminated site in the Granger subdivision is estimated to have 100,000 kg of contaminated soils that need to be moved. The second PCB site has not yet been assessed. The Whitehorse tar pit site will be assessed in 1990.

384 DEW LINE SITES

The Distant Early Warning (DEW) Line is composed of a series of radar stations that were constructed by the Canadian and United States military. There are three DEW Line sites in the Yukon, two of which are operational and one which is abandoned. A field investigation carried out by Environment Canada in 1984, estimated that each operating site had 1500 kg of equipment containing approximately 305 litres of PCB fluid. A report by Stanley and Associates in 1986 identified a number of additional hazardous wastes at operating DEW line sites (Table 3-23). The United States Air Force (USAF) is responsible for cleanup of the two operating sites. The hazardous waste from these sites will be exported to the U.S. for disposal.

The third site was taken over by the Department of Indian and Northern Affairs in the late 1960's or early 1970's. The site at Stokes Point is now owned by Parks Canada. Hazardous wastes are still located at this site but the specific types and quantities are unknown. The waste types identified in Table 3-23 may or may not be at the Stokes Point site. A site assessment is required to determine the amounts and types of hazardous waste. Any hazardous waste found at this site will have to be dealt with by a Yukon waste management strategy.

TABLE 3-22

Contaminated Soil Sites in Whitehorse Region

| Site | Contaminant | Quantity (kg) |
|---|---|---|
| Granger Subdivision | PCB | 100,000* |
| Private Land-Carcross Cutoff | PCB | Undetermined |
| Whitehorse Tar Pit | Oil Residuals | Undetermined |

* Source: Envirochem, 1989, report prepared for Department of Community and Transportation Services.

TABLE 3-23

Potential Hazardous Waste Types at Operating DEW Line Sites

| | |
|---|---|
| waste oil | transmission fluid |
| PCB transformers/capacitors | 1-1-1 trichloroethane |
| asbestos | PBX telephone equipment |
| lead-based paints | mercury vapour rectifier tubes |
| radioactive tubes | paint thinners |
| lime | batteries |
| antifreeze | chlorinated hydrocarbons |
| aviation fuel | corrosion inhibitors |
| sulfamic acid | lye |
| filtron tubes | corrosives |
| dynamite | solvent |
| RF interference filters | |

* Adapted from Stanley 1986.

## 3.9 HAZARDOUS WASTES IN STORAGE

In addition to hazardous waste generated on an annual basis or non routine basis, there are those that have been generated in the past but are being stored because they cannot be properly treated or disposed of using existing Yukon facilities. Approximately 44 tonnes of hazardous waste was reported to be in storage during the inventory survey.

The most common hazardous waste in storage were PCBs. Table 3-24 identifies the PCB storage sites in the Territory. All of the PCB storage sites identified have been inspected by Environment Canada. The remaining storage sites have, for the most part, not been inspected and consist of designated areas or drums at a plant.

## 3.10 FUTURE WASTE GENERATION

Hazardous waste generation may change in the future depending on three primary factors:

- passing of hazardous waste management legislation;
- changes in personal lifestyles and attitudes of the waste generators; and
- if a 4R (reduce, reuse, recycle and recover) policy is adopted and implemented by Yukon governments, industries and southern suppliers.

TABLE 3-24

PCB's in Storage*

| Operator | Location | Waste Type | Quantity in Storage (kg) |
|---|---|---|---|
| DIAND | Whitehorse Region | PCB - high conc. | 8 |
| | | PCB - low conc. | 145 |
| Environmental Protection | Whitehorse Region | PCB - high conc. | 21 |
| | | PCB - low conc. | 340 |
| Public Works Canada | Whitehorse Region | PCB - high conc. | 18 |
| Transport Canada | Western Region | PCB - 2 drums | N.A. |
| Transport Canada | Eastern Region | PCB - high conc. | 12 |
| Transport Canada | Whitehorse Region | PCB - high conc. | 7 |
| | | PCB - low conc. | 136 |
| Yukon Govt. Services | Whitehorse Region | PCB - high conc. | 4 |
| City of Whitehorse | Whitehorse Region | PCB - high conc. | 2 |
| Yukon Energy Corp. | Whitehorse Region | PCB - high conc. | 1,067 |
| | | PCB - low conc. | 11,200 |
| Yukon Electrical | Whitehorse Region | PCB - high conc. | 180 |
| | | PCB - low conc. | 2,000 |
| NorthwesTel | Whitehorse Region | PCB - high conc. | 10 |
| | | PCB - low conc. | 11 |
| Whitehorse Copper | Whitehorse Region | PCB - high conc. | 1,372 |
| | | PCB - low conc. | 4,000 |
| United Keno Hill Mines Ltd. | Northern Region | PCB - high conc. | 486 |
| Curragh Resources | Eastern Region | PCB - high conc. | 56 |

Note: All fluid quantities expressed in kilograms by using the conversion of water = 1 kg/litre.

* Adapted from Environmental Protection Inventory of PCB Waste Storage Sites.

N.A. = Not Available

The passing of legislation that focuses on the control of hazardous waste as it moves from point of generation to disposal may increase the amount of waste in the short term. The increase will result from all parties-generators and regulators knowing what is and is not a hazardous waste. Some waste not currently reported as hazardous waste should now be accounted for.

The inventory survey noted changing attitudes among generators towards implementation of a 4R program. Many expressed interest in 4R program options for their industry. If a 4R program was adopted the amount of hazardous waste requiring disposal on an annual basis should decrease.

A formalized reporting system is the only way of monitoring whether hazardous waste generation is increasing or decreasing.

Three non routine wastes: PCB's, contaminated site products and DEW Line Station cleanup residuals should increase in generation over the next 10 years then should decline thereafter. Spill response waste generation, the fourth non routine waste, is dependent on the following:

- road conditions;
- kilometers travelled;
- training of operations; and
- a variety of other unknowns that may affect a load in transport.

# PART 4

# DATA ANALYSIS

PART 4 - DATA ANALYSIS

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## 4.1 INTRODUCTION

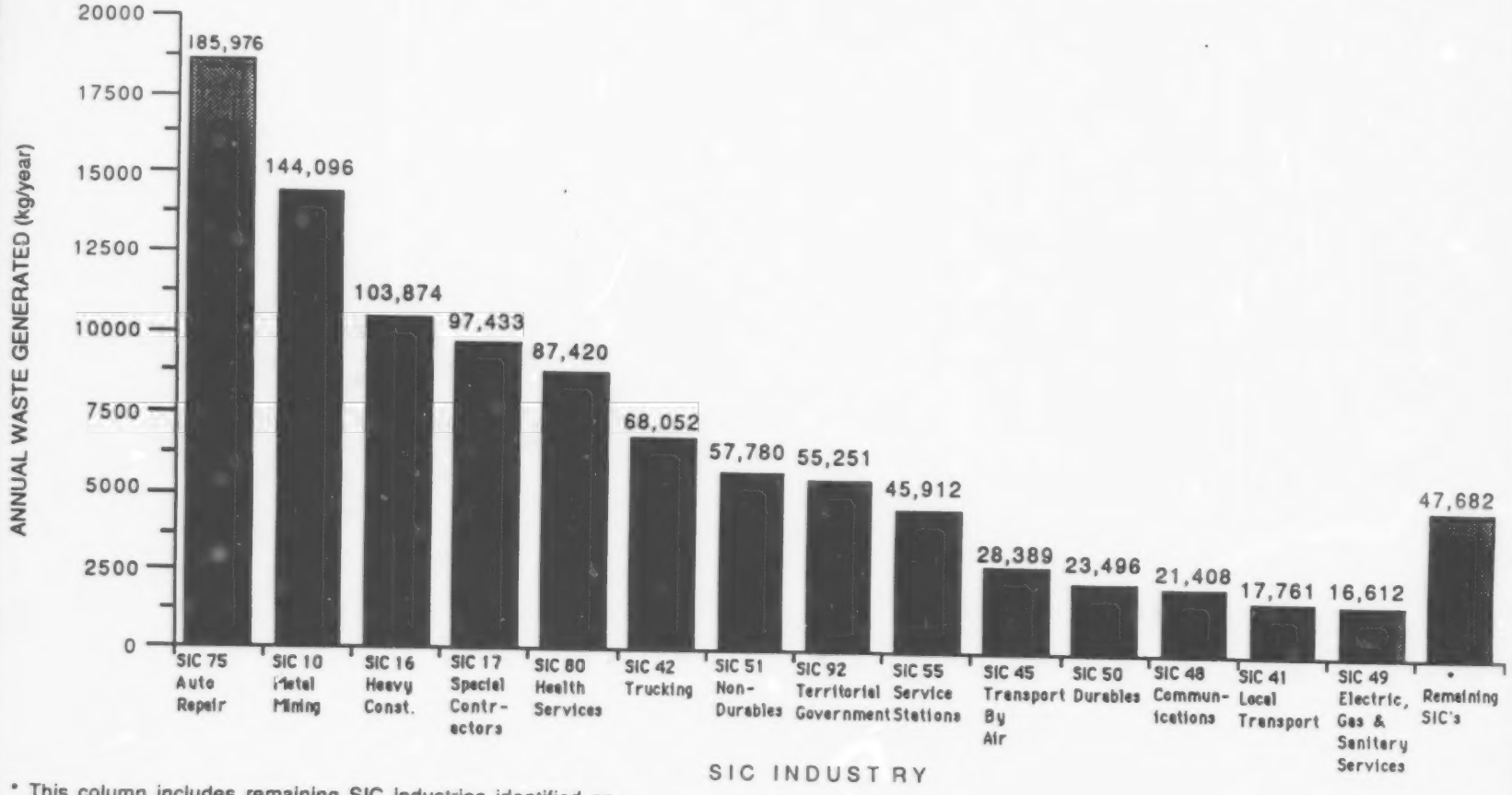
This part of the report analyzes the inventory information presented in Part 3. The intent is to identify trends and compare Yukon information with experience in other jurisdictions as identified in the literature review undertaken.

## 4.2 CHARACTERISTICS OF YUKON WASTE GENERATORS

Potential hazardous waste generators in the Yukon may be described as service companies with a small staff and limited production capability. This reflects the small population and remote location of the Yukon. Only a couple of companies in the Yukon would be considered medium sized waste generators in the Canadian context. This is in contrast to the makeup of waste generators in the rest of Canada which has a relatively large number of manufacturing/processing facilities.

Waste generators in the Yukon are a diverse group with 28 SIC codes identified. Each of these SIC codes contribute significant amounts of waste to the Yukon total. Figure 4-1 estimates the amount of wastes generated by SIC code. The Yukon waste generator contributions contrasts with hazardous waste inventories in the Canadian south. In the various provincial inventories reviewed, 90% of the hazardous waste generated was by 20% of the companies.

The waste generation numbers presented in Figure 4-1 (and throughout Part 3 of the report) must be used with caution. A number of service industry SIC codes include waste amounts generated by other SIC codes. For example, the Yukon Government contracts some service stations across the Territory to service their




* This column includes remaining SIC industries identified as generating hazardous waste in the Yukon. They are:

SIC
- 72 Personal Services
- 31 Leather Products
- 73 Business Services
- 91 Federal Government
- 27 Printing and Publishing
- 24 Lumber & Lumber Products
- 32 Stone, Clay, Glass & Concrete Products
- 93 Municipal Government
- 34 Fabricated Metal Products
- 07 Agricultural Services
- 28 Chemicals & Allied Products
- 82 Educational Services
- 39 Misc. Manufacturing
- 59 Misc. Retail Stores

**FIGURE 4-1**
**AMOUNT OF WASTE GENERATED BY SIC INDUSTRY**
(Excludes Household Hazardous Waste)

R18TE03G

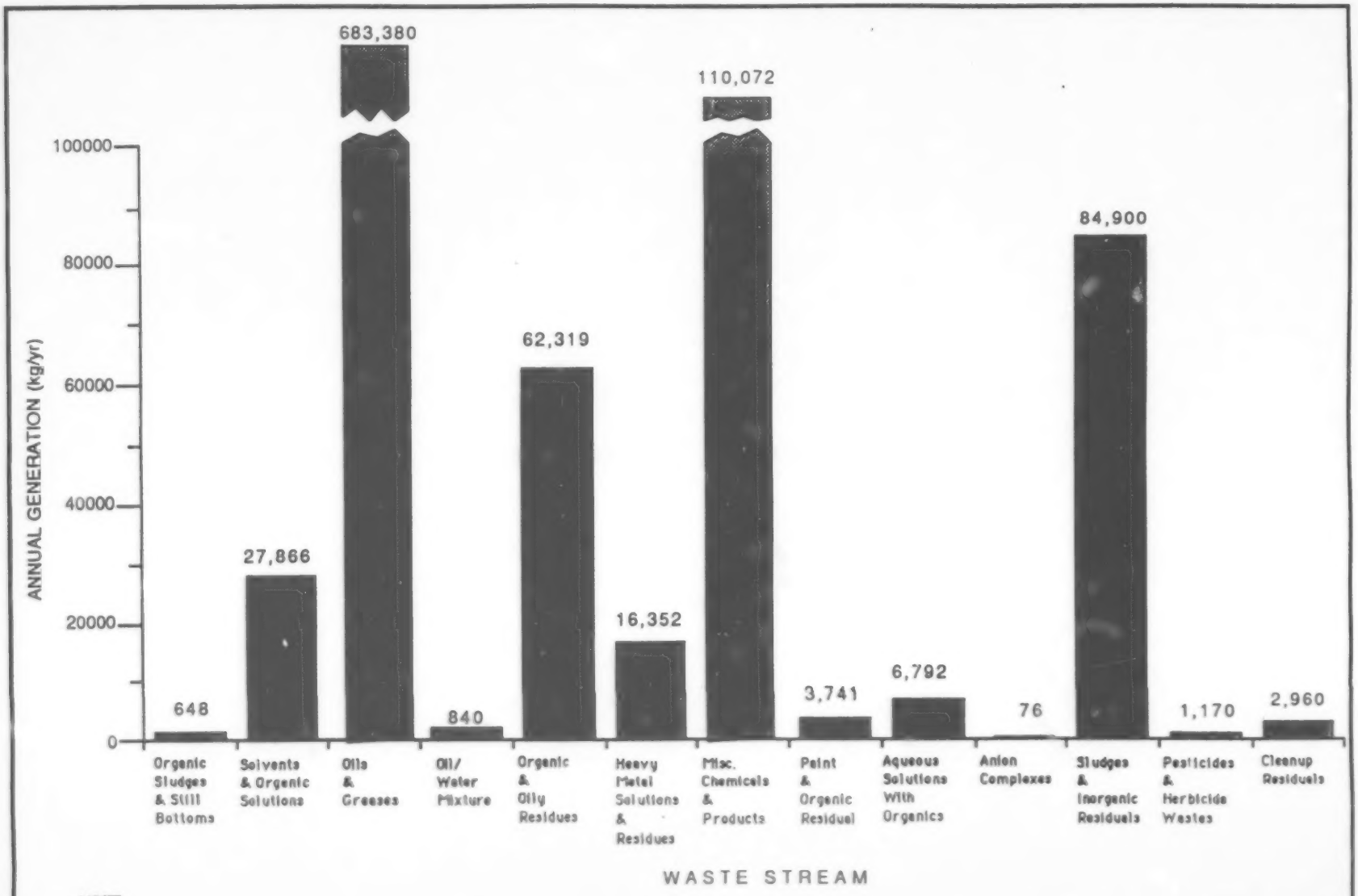
vehicular fleet. Oils from oil changes on the Territorial fleet may be reported under SIC 55 Service Stations and not SIC 92 Territorial Government. The intent is to account for all wastes by identifying those that are responsible for ultimate disposal. Hence, all wastes are accounted for under this approach and management program initiatives can be directed at where the wastes are located.

In the Yukon, Auto Repair Shops (SIC 75) generates the largest volume of hazardous waste with an estimated 186 tonnes per year. Metal Mining (SIC 10) follows with an annual estimated generation of 144 tonnes. The SIC codes that generate the least amount of hazardous waste are Miscellaneous Manufacturing (SIC 39) and Miscellaneous Retail Stores (SIC 59).

Since the Yukon is dominated by small generators, the implications of implementing a management program may be major. Many of these companies have limited financial resources and no technical expertise. Any hazardous waste management program proposed for the Yukon must take these factors into consideration.

## 4.3 SUMMARY OF INDUSTRIAL HAZARDOUS WASTE GENERATION

Figure 4-2 summarizes annual waste generation from industrial sources by CUCD waste stream. Oils and Greases with an annual generation of 683 tonnes is the predominant hazardous waste generated. Oils and Greases represent 68% of all hazardous waste generated in the Yukon. Management initiatives directed at this waste stream are recommended. Oils and Greases are followed by Miscellaneous Chemicals and Products with an annual generation of 110 tonnes. Miscellaneous chemicals and products is comprised of:




NOTE

The PCB waste stream is considered a non routine waste and is not included here

**FIGURE 4-2**
**ANNUAL WASTE GENERATION BY WASTE STREAM (kg/year)**

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| | | | |
|---|---|---|---|
| o | Pathogenic Waste | 83,672 kg/yr | (76%) |
| o | Laboratory Waste Chemicals | 12,036 kg/yr | (11%) |
| o | Acids and Alkali | 6,876 kg/yr | (6%) |
| o | Used batteries | 4,560 kg/yr | (4%) |
| o | Photochemicals | 1,320 kg/yr | (1%) |
| o | Asbestos containing wastes | 612 kg/yr | (0.6%) |
| o | Ink Sludge | 456 kg/yr | (0.4%) |
| o | Contaminated Containers | 420 kg/yr | (0.4%) |
| o | Pharmaceutical Waste | 84 kg/yr | (0.1%) |
| o | Inorganic Solid Chemicals (Explosives) | 24 kg/yr | (0.0%) |
| o | Brine | 12 kg/yr | (0.0%) |

Volume of waste generated should not be the sole criteria for waste management efforts. Although Oils and Greases represent the largest volume of waste, other waste streams have the potential to pose a greater threat to public health, safety and the environment. Heavy metal solutions and residues with an annual generation of 16 tonnes per year (Figure 4-2) should be a priority management category.

## 4.4 GEOGRAPHIC DISTRIBUTION OF YUKON WASTE FROM INDUSTRIAL SOURCES

Figure 4-3 illustrates the geographic location of industrial hazardous waste generators in the Yukon. The Whitehorse Region has 70% of all industrial waste generators located within its boundaries. The Whitehorse Region is followed by the Eastern Region with 13% of the generators and the Northern Region with 12%. The Western Region has the smallest number of hazardous waste generators with 5% of the total.

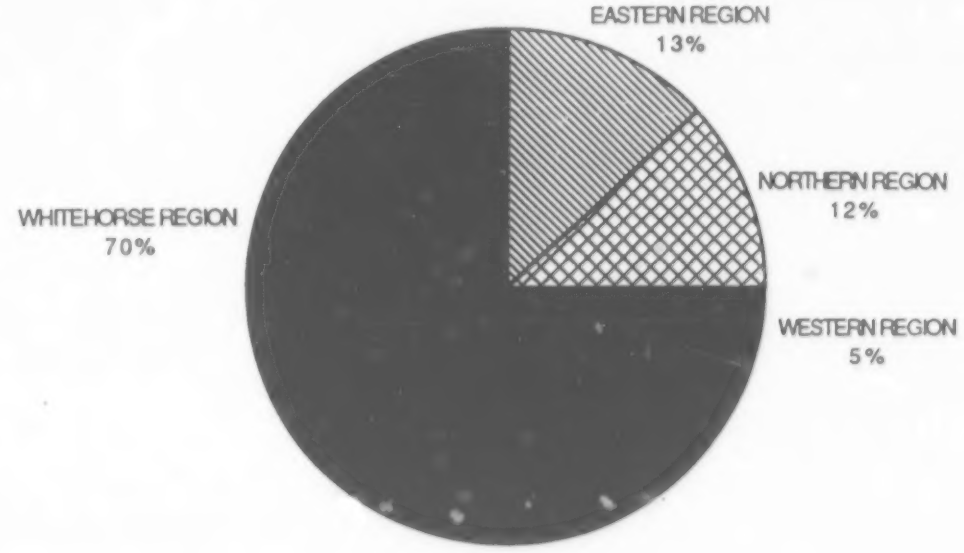


**FIGURE 4-3**
**GEOGRAPHIC LOCATION OF**
**HAZARDOUS WASTE GENERATORS**

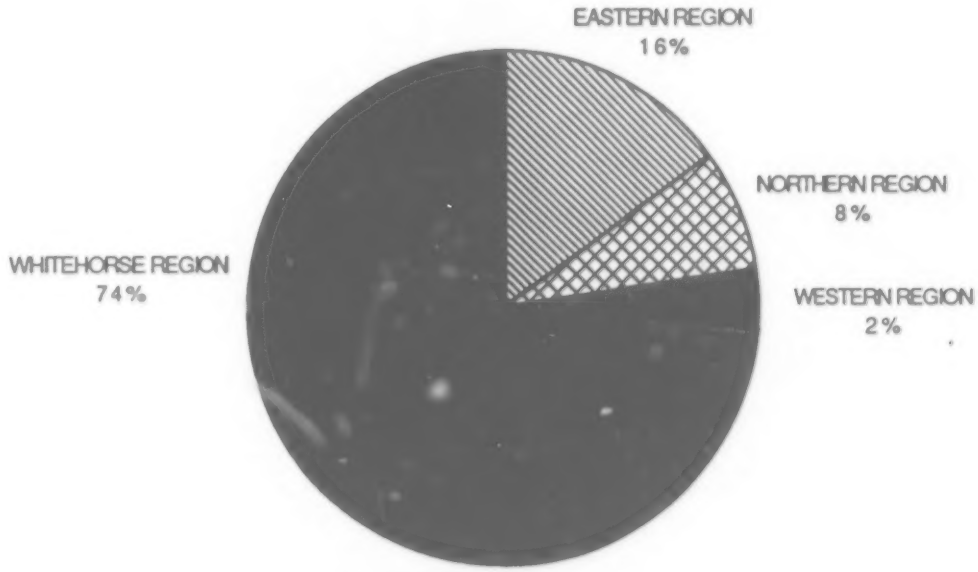


**FIGURE 4-4**
**HAZARDOUS WASTE GENERATION**
**BY GEOGRAPHIC REGION**
(By Weight)

R18TE01G

Table 4-1 identifies by SIC code the amount of hazardous waste generated in each region. Figure 4-4 illustrates hazardous waste generation by geographic region. The Whitehorse Region with 70% of the generators, generates 74% of the hazardous waste in the Territory. The remaining three geographic regions are responsible for 26% of waste generation.

Within the Whitehorse Region seven SIC codes are responsible for generating 79% of the total waste in that region. The SIC codes and their contributions to the Whitehorse Region total are listed below:

SIC 75 Auto Repair - 175 tonnes (24%)
SIC 17 Special Contractors - 97 tonnes (13%)
SIC 16 Heavy Construction - 92 tonnes (12%)
SIC 80 Health Services - 85 tonnes (11%)
SIC 42 Trucking - 67 tonnes (9%)
SIC 51 Non-Durables - 48 tonnes (6%)
SIC 10 Metal Mining - 26 tonnes (4%)

In the Eastern Region 96 tonnes of waste is generated by SIC 10 Metal Mining. This represents 61% of the waste generated in the Eastern Region. In the Northern Region the main waste generator is also SIC 10 Metal Mining with 23 tonnes or 27% of the total within the region. In the Western Region the primary waste generator is SIC 92 Territorial Government, with 14 tonnes per year representing 66% of the total within the region.

TABLE 4-1

Hazardous Waste Generated by SIC Code in Each Region

| SIC Code | Total | Northern Region | (kg) Eastern Region | Western Region | Whitehorse Region |
|---|---|---|---|---|---|
| SIC 75 Auto Repair | 185,976 | 1,320 | 9,708 | 0 | 174,948 |
| SIC 10 Metal Mining | 144,096 | 22,548 | 95,688 | 0 | 25,837 |
| SIC 16 Heavy Construction | 103,874 | 3,828 | 7,008 | 1,408 | 91,628 |
| SIC 17 Special Contractors | 97,433 | 301 | 459 | 0 | 96,673 |
| SIC 80 Health Services | 87,420 | 1,138 | 1,124 | 84 | 85,074 |
| SIC 42 Trucking | 68,052 | 653 | 653 | 0 | 66,746 |
| SIC 51 Non-Durables | 57,780 | 4,836 | 4,836 | 0 | 48,108 |
| SIC 92 Territorial Government | 55,251 | 13,629 | 13,629 | 13,629 | 14,364 |
| SIC 55 Service Stations | 45,912 | 8,916 | 16,948 | 1,632 | 18,416 |
| SIC 45 Transport by Air | 28,389 | 0 | 2,877 | 0 | 25,512 |
| SIC 50 Durables | 23,496 | 8,251 | 0 | 0 | 15,245 |
| SIC 48 Communications | 21,408 | 2,269 | 2,269 | 2,275 | 14,596 |
| SIC 41 Local Transport | 17,761 | 0 | 912 | 0 | 16,849 |
| SIC 49 Electric, Gas & Sanitary Services | 16,612 | 12,672 | 0 | 1,632 | 2,308 |
| SIC 72 Personal Services | 8,712 | 610 | 871 | 0 | 7,231 |
| SIC 31 Leather Products | 6,768 | 0 | 0 | 0 | 6,768 |
| SIC 73 Business Services | 6,689 | 0 | 0 | 0 | 6,689 |
| SIC 91 Federal Government | 6,012 | 0 | 0 | 0 | 6,012 |
| SIC 27 Printing & Publishing | 5,425 | 0 | 0 | 0 | 5,425 |
| SIC 24 Lumber and Lumber Products | 5,400 | 864 | 918 | 0 | 3,618 |
| SIC 32 Stone, Clay, Glass | 2,762 | 0 | 0 | 0 | 2,762 |
| SIC 93 Municipal Government | 2,536 | 0 | 0 | 0 | 2,536 |
| SIC 34 Fab. Metal Products | 1,590 | 0 | 0 | 0 | 1,590 |
| SIC 07 Agriculture Services | 1,009 | 172 | 0 | 97 | 740 |
| SIC 28 Chemicals & Allied Products | 456 | 0 | 12 | 0 | 444 |
| SIC 82 Education Services | 221 | 51 | 85 | 34 | 51 |
| SIC 39 Misc. Manufacturing | 90 | 17 | 0 | 0 | 73 |
| SIC 59 Misc. Retail Stores | 12 | 1 | 0 | 0 | 11 |
| SIC 99 Household Hazardous Waste | 53 | 5 | 8 | 3 | 37 |
| Total | 1,001,167 | 82,081 | 158,005 | 20,794 | 740,291 |

## 4.5 HAZARDOUS WASTE IN STORAGE

Hazardous wastes are being stored throughout the Yukon primarily on a waste generator's property. The wastes in storage are primarily residuals. The exact number and location of storage sites is unknown. Also the specific types of waste stored, quantities stored and environmental integrity of these sites is not known.

Environment Canada does have a handle on the PCB sites in the Yukon, as a result of Federal initiatives arising from the Quebec PCB fire in 1988. Table 3-24 identified the 14 sites in the Yukon and all of these sites have been inspected by Environment Canada. The PCB sites all meet Federal design guidelines.

Ideally, all hazardous waste storage sites should be governed in a manner similar to the existing PCB sites.

## 4.6 HAZARDOUS WASTE DISPOSAL

Table 4-2 identifies the quantities of hazardous waste, by waste stream, directed to seven types of waste disposal categories.

The land disposal category includes the following disposal options:

- o landfill at municipal dump sites;
- o land application; and
- o burial at remote locations.

TABLE 4-2

Hazardous Waste Storage/Disposal in the Yukon
(Quantities [kg])

| Waste Stream | Land Disposal | Burned | Incinerated | Drain | Dust Suppression | In Storage | Sent out of Yukon |
|---|---|---|---|---|---|---|---|
| Organic Sludges and Still Bottoms (no oil) | 648 | 0 | 0 | 0 | 0 | 0 | 0 |
| Solvent and Organic Solutions | 12,013 | 14,367 | 0 | 332 | 1,154 | 0 | 0 |
| Oils and Greases | 345,003 | 315,768 | 0 | 0 | 22,607 | 0 | 0 |
| Oil/Water Mixture | 0 | 0 | 0 | 840 | 0 | 0 | 0 |
| Organic and Oily Residues | 29,235 | 20,220 | 0 | 0 | 0 | 12,864 | 0 |
| Heavy Metal Solutions and Residuals | 870 | 0 | 0 | 15,430 | 0 | 3,417 | 26.4 |
| Miscellaneous Chemicals and Products | 15,048 | 24 | 83,628 | 8,736 | 0 | 5,995 | 570 |
| Paint and Organic Residuals | 3,717 | 24 | 0 | 0 | 0 | 0 | 0 |
| Aqueous Solutions with Organics | 108 | 0 | 0 | 6,684 | 0 | 0 | 0 |
| Anion Complexes | 0 | 0 | 0 | 71 | 0 | 5 | 0 |
| Sludges and Inorganic Residuals | 84,852 | 0 | 0 | 14 | 0 | 7 | 24 |
| Pesticides and Herbicide Wastes | 1,170 | 0 | 0 | 0 | 0 | 0 | 0 |
| PCB Wastes | 0 | 0 | 0 | 0 | 0 | 21,691* | 0 |
| Clean-up Residuals | 1,085 | 0 | 1,873 | 0 | 0 | 0 | 0 |
| TOTAL | 493,749 | 350,403 | 85,501 | 32,107 | 23,761 | 43,979 | 620 |

* Most PCBs are stored at Environment Canada designated storage sites.

Hazardous waste disposal options under the Burned category includes:

- o burning substances for heat in waste oil furnaces; and
- o open burning of substances in barrels.

The category of Incineration consists of all the hazardous waste directed to the Whitehorse General Hospital Incinerator. This includes cleanup residuals and pathological wastes generated by medical, dental and veterinary facilities.

The Drain category includes the disposal options where generators reportedly poured hazardous liquid substances into a drain.

Dust Suppression is a method of disposal where waste oil and waste oil contaminated with solvents is applied to road and walkway surfaces.

Storage site facilities that are included under the In Storage category are:

- o wastes stored at industrial sites;
- o wastes stored at schools and labs;
- o wastes stored at vehicle service industrial sites; and
- o wastes stored at Environment Canada designated storage sites.

Waste sent out of the Yukon represents hazardous wastes sent to another jurisdiction for disposal in an approved facility.

Land disposal is the ultimate disposal destination for 48% of the hazardous waste generated in the Yukon (Figure 4-5). An additional 34% of the waste is burned. Incineration of primarily pathological wastes is responsible for 8.3% of the hazardous waste treated in the Yukon. Ash from incineration is directed to a landfill for disposal. Three percent of the generated waste is disposed of by a drain, 2.3% is used as a dust suppressant and 4.3% is in storage. The remaining hazardous waste is sent out of the Yukon for disposal. This occurs only when a treatment/disposal facility has been identified and approvals have been received from the receiving jurisdiction.

## 4.7 TRANSPORTATION OF HAZARDOUS WASTE THROUGH THE YUKON

There is a significant amount of hazardous waste transported through the Yukon every year from the following jurisdictions:

- Alaska;
- Northern British Columbia; and
- Mackenzie Delta Region of the Northwest Territories.

The purpose of this section is to put into perspective the amount of hazardous wastes transported through the Yukon versus the amount generated in the Yukon.

For the period November 1988 to November 1989 a total of 245 tonnes was transported. This amount represents 24% of the annual waste generation in the Yukon. Table 4-3 summarizes hazardous waste transported through the Yukon.

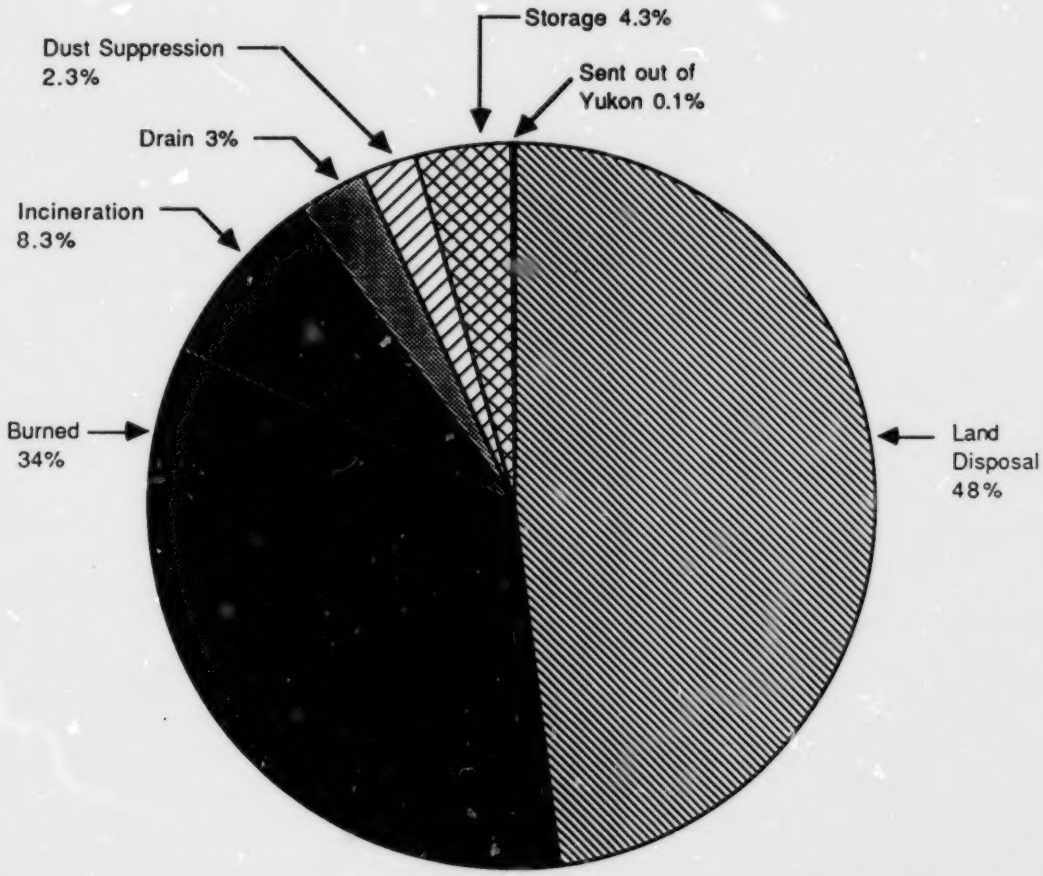


**FIGURE 4-5**
**HAZARDOUS WASTE DISPOSAL METHODS**
**(% by Kg)**

R18TE07G

TABLE 4-3

Transportation of Hazardous Wastes Through the Yukon

| Date | Waste Type | Quantity |
|---|---|---|
| November 1989 | o PCBs, other hazardous wastes | 37,000 kg |
| October 1989 | o PCBs | 13,000 kg |
| | o Flammable corrosive poisons | 7,000 kg |
| September 1989 | o PCB liquids | 16,000 |
| | o Flammable liquids | 15,000 |
| | o Flammable, corrosive, poisonous liquids | 14,000 |
| August 1989 | o PCB liquids | 36,000 |
| June 1989 | o PCB, flammable | 9,000 |
| | o Waste flammable, oxidizers, other wastes | 12,000 |
| | o PCB liquids/solids | 12,000 |
| May 1989 | o PCB Soil | 19,000 |
| | o Waste flammables | 6,500 |
| April 1989 | o Flammable liquids | 2,000 |
| | o Waste Oil | 1,200 |
| | o Paint | 600 |
| | o Sulphuric Acid | 400 |
| | o PCB liquid | 200 |
| March 1989 | o PCB oil, soil, debris | 8,000 kg |
| | o Waste corrosive liquid | 1,200 kg |
| | o Paint | 1,000 kg |
| | o Battery | 400 kg |
| | o DDT | 200 kg |
| February 1989 | o PCBs, flammable liquid | N.A. |
| January 1989 | o Flammable liquid, halogens | 9,000 kg |
| December 1988 | o Chlorinated solids | 1,900 kg |
| November 1988 | o PCB liquid | 18,000 kg |
| | o Acids | 2,200 kg |
| | o Ammonia | 1,400 kg |
| | o Flammable liquids | 600 |
| | o Acetate | 200 |
| | o Calcium Hypochlorite | 200 |
| | o Malathion | 200 |
| | Total Amount Identified | 245.4 tonnes/yr |

N.A. = Not Available

The potential of a hazardous waste spill involving waste from another jurisdiction is a real possibility. In Part 3, spill response waste was noted to be generated on a non routine basis. A facility may be needed in the Yukon, to temporarily store waste resulting from a spill involving waste originating outside the Yukon. This facility should include a detention facility where a disabled transport vehicle could unload.

In addition a management program for hazardous wastes should address waste transported through the Yukon in other ways. The program should ensure transporters are bonded and carry environmental liability insurance. This will ensure that the Yukon environment will be protected while placing the financial burden for cleanup on the transporter.

## 4.8 SUMMARY OF YUKON HAZARDOUS WASTE GENERATION

The inventory survey revealed that an estimated 1,001 tonnes of hazardous waste is generated on an annual basis from industrial sources. This compares favourably with the 1,300 tonnes of waste expected to be generated based on industry information available in the literature. In addition to the industrial hazardous waste, an estimated 53 tonnes of hazardous waste is generated by Yukon households annually.

Non routine wastes are extremely difficult to quantify on an annual basis, because most of these waste types are generated as a result of accidental spills. Similarly, contaminated sites that may contribute to the non routine waste stream in the form of remedial action residuals cannot be quantified until site

assessments are completed. The Granger subdivision site has been assessed and an estimated 100 tonnes of PCB contaminated soil must be moved.

There are approximately 44 tonnes of waste that are currently in storage across the Territory. This amount represents waste that has been generated by Yukon companies in the past but had no acceptable treatment or disposal option.

# PART 5

# HAZARDOUS WASTE - A REGULATORY DEFINITION

PART 5 - HAZARDOUS WASTE - A REGULATORY DEFINITION

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## 5.1 INTRODUCTION

The defining of the term hazardous waste for regulatory purposes, is an important step in the development of a management program for the Yukon. Until hazardous wastes are defined, generators, transporters, disposal site operators and regulatory agencies will not be able to distinguish between what is and what is not hazardous. The confusion that currently exists in the Yukon over what is classified as hazardous (see Part 3) stems partly from the absence of a Yukon specific definition. The following discussion addresses the issue of a hazardous waste definition for regulatory purposes.

## 5.2 HAZARDOUS VERSUS SPECIAL WASTE

Criticism was levelled at the adjective "hazardous" when Alberta attempted to define a hazardous waste in the early 1980's. At the public hearings some people said the word was misleading and frightening. In Europe the term "industrial" or "special" waste has been used. In the case of the term industrial however, not all industrial waste is necessarily hazardous. The term "special" on the other hand could include hazardous waste, as well as other types of wastes that due to their chemical or physical characteristics must be handled in a "special" way or requires special facilities.

The adoption of the term "special" however, has been viewed in some jurisdictions as a method of disguising hazardous waste. The term "special" does not provoke the same public opposition as does hazardous. The Yukon News, dated November 17, 1989, in its editorial made this very point.

The decision on whether to call wastes "hazardous" or "special" rests with Yukon politicians. Generally there are hazards associated with the generation, accumulation and management of waste. Such hazards should be kept in view and the term hazardous waste will serve to maintain public vigilance. A term such as "special waste" could be used in describing a facility if it is to handle waste types over and above hazardous wastes.

## 5.3 DEFINING HAZARDOUS WASTE

The definition of hazardous waste must be undertaken at the:

- o statutory level; and
- o substantive level.

Collectively, these two levels of definition should serve as a foundation upon which the management of hazardous waste in the Yukon can be built.

### .1 Statutory Definition

The statutory definition of hazardous waste is an integral part of legislation passed to address hazardous waste. This definition should be kept simple and be consistent with regulatory objectives. The statutory definition should be a generic definition and shall not contain specific criteria, lists or wastes. The definition should instead give generic examples of hazardous waste such as "... including, but not limited to, toxic, flammable, corrosive, reactive, etc...". The listing of generic examples directs the regulatory agencies, courts, industry and the public to what the legislature intends the term hazardous to mean.

An example of a statutory definition is:

> "The term, Hazardous Waste, means any waste or combination of wastes of a solid, liquid, contained gaseous, or semisolid form which because of its quantity, concentration, or physical, chemical, or infectious characteristics, in the judgement of the Department may (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Such wastes include, but are not limited to, those which are toxins, corrosives, flammable materials, irritants, strong sensitizers, or materials that generate pressure through decomposition, heat, or other means."

.2 Substantive Definition

The purpose of the substantive definition is to identify specific wastes as hazardous. There are two major methodologies presently in use:

- o a criteria approach; and
- o a list approach.

Both approaches are difficult to implement. The criteria approach addresses the problem more directly. It identifies those properties of waste that cause hazardous effects to the environment and then recommends methods and procedures to measure these properties (or effects). In this approach the onus is usually on the generator to test their waste to determine whether it is hazardous or not. The drawback of utilizing criteria is that a waste must be retested unless a list is compiled.

In the list approach, wastes are analyzed for certain prescribed characteristics, and depending upon the presence of these characteristics, a hazard judgement is made. Wastes found to be hazardous in the analysis are then placed on a list. In most North American jurisdictions waste listings are based on work undertaken by the Environmental Protection Agency in the United States. Generators of a waste then compare what they have, to what is on the hazardous waste list. The drawback of this approach is that the onus is on the regulatory agency to update the list. Continually updating the list is a formidable task because so many new chemicals are put into use every year.

For the Yukon a combination of the criteria and list approach is recommended. This is discussed in detail in the following section.

## 5.4 SUBSTANTIVE YUKON DEFINITION/CLASSIFICATION OF HAZARDOUS WASTE

Defining the term hazardous waste for substantive purposes in the Yukon should:

- address those waste types that have been, are or could be generated in the Territory;
- be compatible with existing definitions in other jurisdictions in Canada.

One of the substantive definitions of hazardous waste the Yukon should consider is the Alberta definition. The Alberta definition meets the above criteria and is therefore potentially acceptable. An additional advantage of an Alberta definition adopted in the Yukon is that Alberta currently has the only

integrated "special waste" management facility in Canada. Recent statements (November, 1989) made by the Alberta Minister of Environment, Ralph Klein indicates that the Province may at some time in the future open its borders to waste for treatment at the Alberta plant. If this occurs, the Yukon would be able to ship wastes to this facility for treatment and disposal. A common definition between the two jurisdictions should eliminate logistical problems when waste is sent from the Yukon, because all parties will know exactly what it is.

Appendix E contains Alberta Environment Guidelines that are used to develop a working regulatory definition and classification of hazardous waste. For a definition of hazardous waste to be effective, one must be cognizant of existing legislation and ensure that the definition supplements and reinforces the existing legislation. The following is a list of Acts that were considered in the development of Alberta's hazardous waste definition and classification guidelines:

Federal - Transportation of Dangerous Goods Act

Provincial - Transportation of Dangerous Good Control Act
- Clean Air Act
- Clean Water Act
- Public Health Act

A regulatory definition of hazardous waste for the Yukon should take into account at a minimum the following legislation:

Federal - Transportation of Dangerous Goods Act
- Canadian Environmental Protection Act
- Northern Inland Waters Act
- Fisheries Act

Territory - Dangerous Goods Transportation Act
- Public Health Act

The Alberta Hazardous Waste Guidelines consist of four sections that form a step-wise process in determining whether a waste is hazardous. The sections are summarized below.

Section A of the guidelines provides a list of hazardous wastes that are excluded from the classification system. These wastes are already regulated by existing legislation, or else the waste type is impractical to regulate (i.e. household wastes).

Section B contains a list of over 3,000 products, substances and organisms that are defined as being hazardous waste. The list is an adaptation from the Transportation of Dangerous Goods Regulations (SOR 85-77). In addition, a description of containers considered to be hazardous waste is included.

Section C provides a set of criteria that can be used to determine whether mixtures of waste types from Section B, and inert substances, are considered to be hazardous waste. These criteria serve to define wastes that typically fall between the lines of waste types.

Section D provides a step-by-step approach to determine whether a waste is considered hazardous, and whether it is classified in Section B or Section C. A table of chemicals is also included that determines if an unrinsed container is considered to be hazardous.

# PART 6

# RECOMMENDATIONS

PART 6 - RECOMMENDATIONS

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## 6.1 INTRODUCTION

The generation of hazardous waste is a byproduct of Yukon growth and development. As few records have been kept to date, it is impossible to estimate the volume of hazardous wastes already dumped into the environment, their chemical composition or their face.

Generators contacted during the study were unsure of what constituted a hazardous waste, and whether they were generating any or not. Other respondents in the inventory expressed concern about their current waste management practices, and some were storing waste on-site for fear of causing damage to the environment. An interest in directing hazardous waste to proper storage and treatment was stated by many of the respondents.

To improve hazardous waste management in the Yukon, action is required. This part of the report makes recommendations based on the hazardous waste inventory findings.

## 6.2 RECOMMENDATION 1 - DEVELOPMENT OF A HAZARDOUS WASTE MANAGEMENT STRATEGY

The solution to problems posed by hazardous waste and allaying Yukon resident fears, is the development of a comprehensive hazardous waste management program. The major goals of a comprehensive hazardous waste management program for the Yukon should be:

- cognizance over quantities, sources, types, destinations and disposition of hazardous wastes within or passing through the Territory;

- control over the entire life cycle of hazardous waste from point of generation through storage, transportation, treatment and disposal;

- capability to provide technical assistance to those requesting it and to monitor and enforce a Territorial regulatory program;

- alternatives offered to those practices determined to be inadequate or unacceptable; and

- prevention of adverse impacts on public health, safety and the environment.

Experience in other jurisdictions has lead to the "pathway approach to control". In the pathway approach to management, the Territorial and to a lesser extent the Federal government should regulate waste as it moves from point of generation through storage, collection, transportation and disposal.

The regulation and control of the pathways which wastes follow provides a more effective solution to the problem of hazardous waste generation compared with control of specific industry by industry sources.

For the Yukon to have an effective waste management program the following elements should be included:

- legislative authority including a definition of a hazardous waste;

- adequate personnel and monetary resources to implement the program;
- published criteria and standards;
- established permit mechanisms;
- transportation manifest system; and
- surveillance and enforcement functions.

An effective program should probably involve functions and responsibilities beyond those listed above, but the omission of any of them would severely hinder a program.

The Yukon should expect to go through two distinct phases in developing an effective hazardous waste management program. These may be called "Development and Implementation" and "Operational" phases. The first phase may require one to three years, while the second phase encompasses everything thereafter.

During the "Development and Implementation" phase, the Yukon should develop procedures; develop and promulgate standards, criteria and guidelines; obtain staff members; and emphasize training of both the regulatory staff and the regulated community (in the sense that the regulated community should be made familiar with the requirements of the new program).

The "Operational" phase should see the Yukon beginning its emphasis on enforcement, surveillance and monitoring activities. During this phase, the Yukon should allocate about seventy-five per cent of the resources to be used to continue the developmental tasks, and for administration and management. This is in contrast

with the initial phase, in which about ten per cent of the available resources may be expected to go to administration and management, with the remaining ninety per cent going to development of the program.

A second contrast between the two phases is in the importance of field work. The Yukon should give field investigation and surveillance activities a lower priority than in-house tasks during the developmental stages of the program, but should reverse the ordering of activities in the operational phases.

## 6.3 RECOMMENDATION 2 - CREATION OF A HAZARDOUS WASTE MANAGEMENT COMMITTEE

The management of hazardous waste encompasses several phases of planning and operation. It is recommended that a committee be established to direct Yukon management efforts. The committee should consist of Federal and Territorial representatives as well as members of the general public. Committee responsibilities should be to recommend a definition for hazardous waste, review collection, transfer, storage and disposal practices and options. The committee should direct the development of a waste management program as described in Recommendation 1, and ensure that long term objectives are met. A key responsibility of the committee should be to disseminate information to the public and to receive feedback on how the strategy could be improved.

## 6.4 RECOMMENDATION 3 - DEVELOPMENT OF A PUBLIC INFORMATION PROGRAM

A successful hazardous waste management plan requires an educated public with respect to hazardous wastes. The inventory survey revealed that a segment of the population is presently unaware of what hazardous wastes are, and their potential to adversely affect health and the environment.

A public information program is recommended that describes hazardous waste, identifies roles of the generator and the public and describes management goals. Table 6-1 summarizes the capabilities of public participation techniques that could be utilized.

The Manitoba Hazardous Waste Management Corporation (M.H.W.M.C.) publishes a newsletter to update and inform the public of M.H.W.M.C. activities and current issues in hazardous waste management. The articles are written in a way that is understandable to the general public. The newsletter provides tips on what the public can do to help as well as general information regarding hazardous wastes.

Experience in other jurisdictions with hazardous waste management programs, demonstrates that it is very important to meaningfully involve the public in the process of developing strategies. Residents need to feel they have access to information and some degree of influence in the planning stages. If Yukon residents become negative about the project, it will create a difficult situation that will result in project delays. It is recommended that an open house or public meeting be held to inform people of current conditions, available options, site selection strategies and a description of facilities required.

TABLE 6-1

Capabilities of Public Participation Techniques

| Public Participation Technique | Communication Characteristics | | |
|---|---|---|---|
| | Level of public contact achieved | Ability to handle specific interest | Degree two-way communication |
| Public Hearings | H | L | L |
| Public Meeting | H | L | M |
| Mailings | H | M | L |
| Contact Persons | L | M | H |
| Newspaper Articles | H | L | L |
| News Releases | H | L | L |
| Audio-Visual Presentations | M | L | L |
| Newspaper Advertisements | H | L | L |
| Posters, Brochures, Displays | H | L | M |
| Workshops | L | M | H |
| Tours/Field Trips | L | M | H |
| Telephone Line | H | M | M |

L = Low
M = Medium
H = High

Source: U.S.E.P.A., 1980.

## 6.5 RECOMMENDATION 4-DEVELOPMENT OF WASTE MANAGEMENT PROGRAMS/FACILITIES

There is a variety of ways that the 14 different waste streams generated in the Yukon could be treated and disposed of. Table 6-2 lists some representative treatment and disposal options. The volumes generated in the Yukon are small and some of the treatement/disposal options may not be viable.

The recommended comprehensive integrated strategy for management should include:

- a good housekeeping policy by all generators that would focus on reducing, reusing, recycling and recovering hazardous wastes - this is referred to as the 4R's approach;
- the designation of one landfill in the Territory (Whitehorse Region) as a secure landfill that will be monitored and will have the capability of handling certain types of approved hazardous waste (eg. asbestos); and
- the construction of a centralized storage facility that will ultimately serve as a transfer station, to send hazardous waste out of the Yukon that cannot be environmentally or economically treated within the Territory.

TABLE 6-2

Consolidated UCD Classification
Representative Yukon Options for Treatment and Disposal

| Description of Waste Stream | Physical Characteristics | Chemical Characteristics | Treatment Options | Resource Recovery | Disposal Options |
|---|---|---|---|---|---|
| ORGANIC SLUDGES AND STILL BOTTOMS (NO OIL)<br>Organic sludges containing metals<br>Halogenated still bottoms<br>Non-Halogenated still bottoms | Viscose or Thixotropic when dewatered | Generally burnable except ash may contain metals. Heating value is net positive, but may require drying or special air pollution control for combustion. | o Incineration | | o Landforming.<br>o Shipment out of Yukon.<br>o Secure landfill. |
| SOLVENTS AND ORGANIC SOLUTIONS<br>Halogenated<br>Non-Halogenated<br>Mixed | Liquid with some solid contaminants | Reasonably flammable.<br>High heating value.<br>Halogenated vapours may be corrosive. | o Incineration | o Collection for shipment out of Yukon for distillation/ blending | |
| OILS AND GREASES<br>Waste Lube Oil<br>Other Oils and Grease | Dirty lube oils, cutting oils, hydraulic oils. Most contain contaminants. | High heating value.<br>Generally neutral pH. | o Incineration | o Collection for shipment out Yukon for distillation | o Landfarming.<br>o Shipment out of Yukon for disposal.<br>o Secure landfill. |
| OIL/WATER MIXTURES<br>Emulsified and Free Oil/Water Mixtures | Liquid with separate or dispersed phases. May become viscous at low temperatures. | Generally neutral, low pH may result from emulsion breaking. Usually no positive heating value before separation. | o Incineration | o Collection for shipment out of Yukon | o Landfarming.<br>o Shipment out of Yukon.<br>o Secure landfill. |

TABLE 6-2 (Cont'd)

| Description of Waste Stream | Physical Characteristics | Chemical Characteristics | Treatment Options | Resource Recovery | Disposal Options |
|---|---|---|---|---|---|
| ORGANIC AND OILY RESIDUES<br>Leaded Gasoline<br>Unleaded Gasoline and<br>Organics Food Waste Oil | Thick multi-phase material. Most have inorganics in with organics. May be thick or thixotropic. | Partly combustible pH may be variable. Could be volatile or odourous. May be explosive in confined containers. | o Incineration | o Collection for shipment out of Yukon for reuse or distillations | o Landfarming.<br>o Secure Landfill.<br>o Transport out of Yukon for disposal. |
| HEAVY METAL SOLUTIONS AND RESIDUALS<br>Spent plating or etching<br>Rinse and less concentrated aqueous solutions<br>Sludges from plating and etching lines<br>Sludges from treatment of solutions containing metals | Acid or alkaline liquids, frequently with solids in solution.<br>Somethings difficult to pump, physical dewatering required. Reclamation difficult because of stable precipitates. | Extreme pH swings. Complexation is prevalent, special pretreatment is usually needed.<br><br>Stable chemical precipitates. Highly complexed ammonia, sulfide and/or cyanide species | | | o Transport out of Yukon for disposal.<br>o Secure landfill. |
| MISCELLANEOUS CHEMICALS AND PRODUCTS<br>Organic Chemicals<br>Inorganic Chemicals<br>Salts, Infectious | Properties variable. Some solids and liquids containers found in all sizes including small laboratory sizes. | Entire spectrum of products and properties. | o Incineration | o Possible but no general technology. | o Must be packed for disposal at secure landfill.<br>o Transport out of Yukon for disposal. |
| PAINT AND ORGANIC RESIDUALS<br>Latex paint and sludge<br>Solvent based Paint and sludge<br>Wash and Rinse waters<br>Adhesives and Glue | Thick sludge consists of aged paint and heels from drums. Highly viscous. | Mixtures may contain solvents. Also some chromium, zinc, lead found in pigments. | o Incineration | | o Secure landfill.<br>o Transport out of Yukon for disposal. |

TABLE 6-2 (Cont'd)

| Description of Waste Stream | Physical Characteristics | Chemical Characteristics | Treatment Options | Resource Recovery | Disposal Options |
|---|---|---|---|---|---|
| AQUEOUS SOLUTIONS WITH ORGANICS (90% Water)<br>Alcohols and Organic Acids<br>Halogenated Solvents<br>Non-Halogenated Solvents | May have volatile components. Sometimes particulate contaminants are present. | Largely neutral wastes with residual organics. May be azeotropic in nature. | | o Collection for transport out of Yukon. | o To Sewer.<br>o Secure landfill<br>o Transport out of Yukon for disposal. |
| ANION COMPLEXES<br>Cyanide<br>Sulfide<br>Other Complexes | High TDS material which can be corrosive or erosive. | Found in combination with metals or high salt solutions. pH is neutral to alkaline. | | | o Transport out of Yukon for disposal. |
| SLUDGES AND INORGANIC RESIDUALS<br>Ash<br>Spent Catalyst | Most are solids with small amount of water. Most are not reactive. Some low rate leaching expected for arsenic, cadmium, acid, etc. | Chemically inert except for residual ion concentrations. Leachates may be either acid or alkaline. | | | o Transport out of Yukon for disposal.<br>o Secure landfill. |
| PESTICIDE AND HERBICIDE WASTES<br>High Concentration Organics<br>High Concentration with metals<br>Cleanup waster and dilute solutions | Liquids or solids. Solids are likely to be present with inorganic Carrier. | Reactive compounds. Some halogens present. Some reactive non-metals. | o Incineration | | o Return to supplier.<br>o Transport out of Yukon for disposal.<br>o Secure landfill. |

TABLE 6-2 (Cont'd)

| Description of Waste Stream | Physical Characteristics | Chemical Characteristics | Treatment Options | Resource Recovery | Disposal Options |
|---|---|---|---|---|---|
| PCB WASTES<br>High concentration liquids (>500 ppm)<br>Medium concentration liquids (<500 ppm)<br>Contaminated Soil (<50 ppm) | High strength wastes are mostly liquids. Medium strengths may be flushing liquids or soil or metals in contact with high strength. | Unreactive except for high chloride content. Volatility is low but lighter aroclor's are volatile. | o Incineration | | o Transport out of Yukon for disposal. |
| CLEAN-UP RESIDUALS<br>Solvent and Organic Waste<br>Inorganic and Metals<br>Pesticides and Herbicides | Cleanup material are largely soil contaminated or wastes absorbed onto some solid matrix. | Chemical composition depends upon nature of spill. | o Incinceration | | o Secure landfill.<br>o Transport out of Yukon for disposal. |

From a social and environmental perspective the 4R's approach is recommended. However, it is recognized that economics will play a major role in a waste generator's decision process. It should be emphasized, that the final decision should be left to a generator on where their waste is directed, as long as it is within the framework set by the waste management strategy (see Recommendation 1).

In an ideal world based on annual generation, if the 4R's approach is adopted, an estimated 700 tonnes or 70% of Yukon hazardous waste could be handled this way at a cost. Initially, most if not all waste that could be recycled or reused, will have to be sent out of the Territory to oil re-refining facilities such as Mohawk in British Columbia or Turbo in Alberta. An additional 200 tonnes or 20% of hazardous waste generated could be handled via a secure landfill within the Territory. The remaining 100 tonnes or 10% of hazardous wastes generated should be sent out of the Territory for disposal in another jurisdiction (e.g. Alberta Swan Hills plant).

The waste sent out of the Yukon should be consolidated prior to shipment via a centralized storage facility/transfer station. The advantages of centralized storage/transfer are that:

- waste may be consolidated in one location, thereby increasing the economies of scale and allowing for proper design, construction and operation;

- existing storage facilities could be eliminated and with them their potential to adversely affect health and the environment; and

- a facility will be in place that may serve as a high profile solution for Yukon hazardous waste generators.

Detailed studies are recommended on:

- criteria to select a storage site;
- storage site design (non-routine waste such as contaminated soil and PCBs must be accounted for); and
- developing an administrative and cost structure for the storage/transfer facility (including covering the topic of liability).

# APPENDIX A

## PERSONS CONTACTED AND LITERATURE REVIEWED

PERSONS CONTACTED

| | |
|---|---|
| Allan, Bob | Manager Emergency Response<br>Environmental Protection - Yukon Branch<br>Environment Canada |
| Ames, Margaret | Crop Demonstrator<br>Agriculture Branch<br>Renewable Resources, Yukon Government |
| Ballantyne, Joe | Head, Land Use<br>Department of Indian and Northern Affairs<br>Yukon Branch |
| Cornett, Dan | Industrial Programs Officer<br>Environmental Protection - Yukon Branch<br>Environment Canada |
| Davidge, Doug | Environmental Assessment Officer<br>Environmental Protection - Yukon Branch<br>Environment Canada |
| Dell, Art | Project Engineer<br>Municipal Engineering Branch<br>Community and Transportation Services<br>Yukon Territorial Government (YTG) |
| Grainger, John | Project Engineer<br>Municipal Engineering Branch<br>Community and Transportation Services<br>YTG |

| | |
|---|---|
| Jackman, P. | Professor Chemical Engineering<br>University of California at Davis<br>Davis, California |
| Jacobsen, N.A. | Boreal Consultants Ltd.<br>Whitehorse |
| Keshvani, Ali | Waste Management Engineer<br>B.C. Department of the Environment |
| McClure, Dave | Inspector of Dangerous Goods<br>British Columbia<br>Vancouver |
| McClure, Rob | W.H.M.I.S. Officer<br>Occupational Health and Safety<br>Y.T.G. |
| Morison, Steve | Area/Regional Manager<br>Exploration and Geological Services<br>Department of Indian and Northern Affairs |
| Thompson, Bob | Inspector of Dangerous Goods<br>Transport Services<br>Community and Transportation Services<br>Y.T.G. |
| Trotter, Dr. D. | Head of Biology<br>Environmental Division<br>Monenco Consultants Ltd.<br>Calgary |

| | |
|---|---|
| Warren, Ross | Safety Director<br>Environment Centre, Vegreville<br>Alberta Environment |

Note*: There were many other people contacted, but are not referenced to ensure confidentiality.

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Note*: Other materials were reviewed such as corporate waste management plans. However this material was not referenced to ensure confidentiality.

# APPENDIX B

## STANDARD INDUSTRIAL CLASSIFICATION (SIC) CODE

Dun & Bradstreet Canada Limited
Dun's Marketing Services

# Dun's Marketing Statistics Selector Form

**Target the markets you wish to reach, by using the Standard Industrial Classification (SIC) or Province full range selectors.**

## PROVINCE SELECTORS

☐ BY ALL CANADA ☐ BY PROVINCES (indicate selection from the following list)

| PROVINCE | PROV CODE | AGR F&F | MIN | CONT | MFG | TCPU | WHOL | RET | FIN | SVCS | GOV | TOTAL | PRIMARY ONLY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ☐ ALBERTA | 06 | 2,699 | 4,583 | 14,017 | 5,615 | 6,344 | 8,971 | 22,190 | 11,641 | 20,836 | 310 | 97,389 | 75,536 |
| ☐ BRITISH COLUMBIA | 12 | 2,709 | 1,661 | 16,010 | 10,971 | 6,911 | 12,030 | 30,221 | 11,286 | 25,570 | 382 | 117,832 | 94,065 |
| ☐ MANITOBA | 24 | 1,725 | 127 | 4,408 | 2,856 | 1,738 | 4,037 | 10,013 | 2,627 | 7,368 | 179 | 35,102 | 25,355 |
| ☐ NEW BRUNSWICK | 30 | 783 | 88 | 2,799 | 1,612 | 1,235 | 1,826 | 7,075 | 1,710 | 4,015 | 101 | 21,315 | 15,872 |
| ☐ NEWFOUNDLAND | 36 | 264 | 73 | 1,930 | 771 | 953 | 1,499 | 6,278 | 1,093 | 2,660 | 131 | 15,819 | 10,655 |
| ☐ NORTHWEST TERRITORIES | 40 | 11 | 26 | 291 | 43 | 209 | 137 | 563 | 129 | 488 | 52 | 1,952 | 1,267 |
| ☐ NOVA SCOTIA | 42 | 1,144 | 111 | 4,043 | 2,086 | 1,506 | 2,587 | 9,133 | 2,953 | 5,828 | 165 | 29,795 | 21,988 |
| ☐ ONTARIO | 48 | 6,643 | 1,206 | 33,275 | 33,491 | 12,980 | 33,001 | 79,621 | 19,260 | 62,965 | 959 | 284,332 | 221,184 |
| ☐ PRINCE EDWARD ISLAND | 54 | 378 | 3 | 477 | 248 | 192 | 333 | 1,250 | 316 | 820 | 24 | 4,061 | 2,980 |
| ☐ QUEBEC | 60 | 4,695 | 491 | 24,643 | 22,865 | 11,506 | 23,285 | 78,407 | 16,238 | 46,023 | 593 | 228,993 | 181,375 |
| ☐ SASKATCHEWAN | 66 | 2,041 | 561 | 4,854 | 1,879 | 1,819 | 3,749 | 11,558 | 2,241 | 6,849 | 177 | 35,756 | 25,275 |
| ☐ YUKON | 72 | 12 | 69 | 231 | 57 | 139 | 95 | 460 | 91 | 343 | 13 | 1,511 | 1,043 |
| ☐ CANADA TOTAL | | 23,104 | 9,009 | 106,978 | 82,494 | 45,532 | 91,550 | 256,769 | 69,585 | 183,765 | 3,086 | 873,857 | 676,595 |

INCLUDES PRIMARY AND SECONDARY LISTINGS AS AT 03/15/89

## INDUSTRY SELECTORS (SIC)

**The following statistics include both the primary and secondary SIC number for all lines of business:**

☐ ALL LINES ☐ BY SIC NUMBER (indicate selection by checking number from following list)

If you desire only those establishments whose primary line of business fits the SIC number indicated, check here. ☐

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐ 0111 thru 0971 | AGRICULTURE, FORESTRY, AND FISHERIES | 23,104 |
| ☐ 01 | AGRICULTURAL PRODUCTION — CROPS | 8,329 |
| 0111 | Wheat | 713 |
| 0112 | Rice | 17 |
| 0115 | Corn | 368 |
| 0116 | Soybeans | 94 |
| 0119 | Cash Grains, nec | 1,368 |
| 0131 | Cotton | 7 |
| 0132 | Tobacco | 182 |
| 0133 | Sugar Crops | 26 |
| 0134 | Irish Potatoes | 434 |
| 0139 | Field Crops Ex Cash Grains | 185 |
| 0161 | Vegetables & Melons | 880 |
| 0171 | Berry Crops | 206 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| 0172 | Grapes | 85 |
| 0174 | Citrus Fruits | 14 |
| 0175 | Deciduous Tree Fruits | 346 |
| 0179 | Fruits & Tree Nuts, nec | 16 |
| 0181 | Ornamental Nursery Plts | 1,453 |
| 0182 | Flowers, Grown Under Cover | 436 |
| 0189 | Horticultural Specs, nec | 63 |
| 0191 | General Farms, Crops | 1,440 |
| ☐ 02 | AGRICULTURAL PRODUCTION — LIVESTOCK | 6,103 |
| 0211 | Beef Cattle Feedlots | 377 |
| 0212 | Beef Cattle Ex Feedlots | 1,774 |
| 0213 | Hogs | 845 |
| 0214 | Sheep & Goats | 88 |
| 0219 | General Livestock, nec | 4 |
| 0241 | Dairy Farms | 1,246 |
| 0251 | Broiler, Fryer Feeds | 246 |
| 0252 | Chicken Eggs | 219 |
| 0253 | Turkeys & Turkey Eggs | 111 |
| 0254 | Poultry Hatcheries | 222 |
| 0259 | Poultry & Eggs, nec | 156 |
| 0271 | Fur Animals & Rabbits | 135 |
| 0272 | Horses & Other Equines | 178 |
| 0279 | Animal Specs, nec | 388 |
| 0291 | General Farm, Livestock | 432 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐ 07 | AGRICULTURAL SERVICES | 6,592 |
| 0711 | Soil Preparation Svcs | 332 |
| 0721 | Crop Plant'g Proac | 331 |
| 0722 | Crop Harvesting | 56 |
| 0723 | Crop Prepare Svcs Mkt | 670 |
| 0724 | Cotton Ginning | 1 |
| 0729 | General Crop Services | 121 |
| 0741 | Veterinary Svcs, Farm Stock | 307 |
| 0742 | Veterinary Svcs Specialties | 715 |
| 0751 | Livestock Svcs Ex Spec | 234 |
| 0752 | Animal Specialty Svcs | 427 |
| 0761 | Farm Labor Contractor | 38 |
| 0762 | Farm Manage Services | 14 |
| 0781 | Landscape Counseling | 870 |
| 0782 | Lawn & Garden Svcs | 2,360 |
| 0783 | Ornamental Shrub Svcs | 260 |
| ☐ 08 | FORESTRY | 863 |
| 0811 | Timber Tracts | 146 |
| 0831 | Forest Nurs & Svcs | 75 |
| 0849 | Extraction Prod Gum | 2 |
| 0849 | Gathering Forest Pdts | 85 |
| 0851 | Forestry Services | 556 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐ 09 | FISHERIES | 1,217 |
| 0912 | Finfish | 801 |
| 0913 | Shellfish | 298 |
| 0919 | Misc. Marine Prdts | 18 |
| 0921 | Fish Hatcheries & Pres | 96 |
| 0971 | Hunt'g Trapp'g Game | 36 |
| 1011 thru 1499 | MINING | 9,005 |
| ☐ 10 | METAL MINING | 2,104 |
| 1011 | Iron Ores | 4 |
| 1021 | Copper Ores | 12 |
| 1031 | Lead Zinc Ores | 9 |
| 1041 | Gold Ores | 51 |
| 1044 | Silver Ores | 16 |
| 1051 | Bauxite Alum Ores | |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| 3443 | Fabricated Plate Work | 384 |
| 3444 | Sheet Metal Work | 852 |
| 3446 | Arch Metal Work | 498 |
| 3448 | Prefab. Metal Buildings | 170 |
| 3449 | Misc. Metal Work | 34 |
| 3451 | Screw Machine Products | 86 |
| 3452 | Bolts, Nuts, Rivets & Washers | 127 |
| 3462 | Iron & Steel Forging | 88 |
| 3463 | Nonferrous Forgings | 13 |
| 3465 | Automotive Stamping | 131 |
| 3466 | Crowns & Closures | 15 |
| 3469 | Metal Stampings nec | 423 |
| 3471 | Plating & Polishing | 364 |
| 3479 | Metal Coating & Allied Services | 351 |
| 3482 | Small Arms Ammunition | 14 |
| 3483 | Ammunition, Ex. For Small Arms | 5 |
| 3484 | Small Arms | 10 |
| 3488 | Ordnance & Accessories nec | 6 |
| 3493 | Steel Springs | 70 |
| 3494 | Valves & Pipe Fittings | 248 |
| 3495 | Wire Springs | 25 |
| 3496 | Misc. Fabricated Wire Products | 294 |
| 3497 | Metal Foil & Leaf | 11 |
| 3498 | Fabricated Pipe & Fittings | 74 |
| 3499 | Fabricated Metal Products | 887 |

**☐ 35 MACHINERY, EXCEPT ELECTRICAL ..... 9,149**

| | | |
|---|---|---|
| 3511 | Steam Engines, Turbines | 53 |
| 3519 | Internal Combustion Engines nec | 48 |
| 3523 | Farm Machinery & Equipment | 574 |
| 3524 | Lawn & Garden Equipment | 36 |
| 3531 | Construction Machinery | 301 |
| 3532 | Mining Machinery | 192 |
| 3533 | Oil Field Machinery | 338 |
| 3534 | Elevators & Moving Stairways | 67 |
| 3535 | Conveyors & Conveying Equipment | 198 |
| 3536 | Hoists, Cranes, Monorails | 98 |
| 3537 | Industrial Trucks & Tractors | 131 |
| 3541 | Machine Tools (Metal Cut) | 357 |
| 3542 | Machine Tools, Metal Forming | 145 |
| 3544 | Special Dies, Tools | 748 |
| 3545 | Machine Tool Accessories | 307 |
| 3546 | Power Driven Hand Tools | 34 |
| 3547 | Rolling Mill Machinery | 17 |
| 3549 | Metalworking Machinery | 72 |
| 3551 | Food Products Machinery | 155 |
| 3552 | Textile Machinery | 34 |
| 3553 | Woodworking Machinery | 105 |
| 3554 | Paper Industries Machinery | 66 |
| 3555 | Printing Trades Machinery | 104 |
| 3559 | Special Industry Machinery | 188 |
| 3561 | Pumps & Its Equipment | 178 |
| 3562 | Ball & Roller Bearings | 14 |
| 3563 | Air & Gas Compressors | 83 |
| 3564 | Blowers & Fans | 191 |
| 3565 | Industrial Patterns | 67 |
| 3566 | Speed Gear Changers | 38 |
| 3567 | Industrial Furnaces, Ovens | 139 |
| 3568 | Power Transmission Equip. | 56 |
| 3569 | General Ind. Machines nec | 561 |
| 3572 | Typewriters | 10 |
| 3573 | Electronic Computing Equipment | 223 |
| 3574 | Calculating & Accounting Mach. | 27 |
| 3575 | Personal Computers | 188 |
| 3576 | Scales & Balances | 47 |
| 3579 | Office Machines, nec | 44 |
| 3581 | Automatic Merchandising Machines | 16 |
| 3582 | Commercial Laundry Equipment | 23 |
| 3585 | Refrig. & Heating Equipment | 214 |
| 3586 | Measuring & Dispensing Pumps | 18 |
| 3589 | Service Industry Machines nec | 251 |
| 3592 | Carburetors, Pistons, Rings | 23 |
| 3599 | Machinery Except Electrical | 2,529 |

**☐ 36 ELECTRICAL EQUIPMENT ..... 3,772**

| | | |
|---|---|---|
| 3612 | Transformers | 117 |
| 3613 | Switchgear, Switchboard Apparatus | 150 |
| 3621 | Motors & Generators | 110 |
| 3622 | Industrial Controls | 297 |
| 3623 | Welding Apparatus | 60 |
| 3624 | Carbon & Graphite Products | 12 |
| 3629 | Electrical Ind. Apparatus nec | 45 |
| 3631 | Household Cooking Equipment | 40 |
| 3632 | Household Refrigerators & Freezers | 26 |
| 3633 | Household Laundry Equipment | 16 |
| 3634 | Electric Housewares & Fans | 118 |
| 3635 | Household Vacuum Cleaners | 30 |
| 3636 | Sewing Machines | 11 |
| 3639 | Household Appliances nec | 24 |
| 3641 | Electric Lamps | 73 |
| 3643 | Current-Carrying Wiring Devices | 85 |
| 3644 | Noncurrent-Carrying Wiring Devices | 67 |
| 3645 | Residential Lighting Fixtures | 102 |
| 3646 | Commercial Lighting Fixtures | 81 |
| 3647 | Vehicular Lighting Equipment | 14 |
| 3648 | Lighting Equipment | 58 |
| 3651 | Radio, TV Receiv. Sets | 197 |
| 3652 | Phonograph Records | 137 |
| 3661 | Telephone & Telegraph Apparatus | 131 |
| 3662 | Radio & TV Communication Equip. | 618 |
| 3671 | Electron Tubes, Receiving Type | 2 |
| 3672 | Cathode Ray Picture Tubes | 11 |
| 3673 | Electron Tubes, Transmitting | 6 |
| 3674 | Semiconductors | 202 |
| 3675 | Electronic Capacitors | 9 |
| 3676 | Electronic Resistors | 7 |
| 3677 | Electronic Coils/Transformers | 41 |
| 3678 | Electronic Connectors | 16 |
| 3679 | Electronic Components | 490 |
| 3691 | Storage Batteries | 17 |
| 3692 | Primary Batteries, Dry, Wet | 22 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| 3693 | X-Ray Apparatus, Tubes | 76 |
| 3694 | Engines Elec. Equipment | 88 |
| 3699 | Electrical Equipment nec | 84 |

**☐ 37 TRANSPORTATION EQUIPMENT ..... 2,575**

| | | |
|---|---|---|
| 3711 | Motor Vehicle Bodies | 175 |
| 3713 | Truck & Bus Bodies | 267 |
| 3714 | Motor Vehicle Parts & Accessories | 582 |
| 3715 | Truck Trailers | 186 |
| 3716 | Motor Homes | 13 |
| 3721 | Aircraft | 45 |
| 3724 | Aircraft Engines & Parts | 74 |
| 3728 | Aircraft Equipment nec | 113 |
| 3731 | Ship Building & Repairing | 143 |
| 3732 | Boat Building & Repairing | 88 |
| 3743 | Railroad Equipment | 43 |
| 3751 | Motorcycle & Bicycle Parts | 57 |
| 3761 | Guided Missiles & Space Vehicles | 2 |
| 3769 | Space Vehicle Equipment | 4 |
| 3792 | Travel Trailers & Campers | 139 |
| 3795 | Tanks & Its Components | 2 |
| 3799 | Transportation Equipment | 127 |

**☐ 38 MEASURING, ANALYZING AND CONTROLLING INSTRUMENTS .1,832**

| | | |
|---|---|---|
| 3811 | Engr. & Scientific Instruments | 174 |
| 3822 | Automatic Temperature Controls | 88 |
| 3823 | Process Control Instruments | 259 |
| 3824 | Fluid Meters & Counting Devices | 39 |
| 3825 | Instruments, Meas. Elec. | 134 |
| 3829 | Measure & Control Devices | 98 |
| 3832 | Eye Instruments & Lenses | 79 |
| 3841 | Surgical & Medical Instruments | 139 |
| 3842 | Surgical Appls. Supplies | 284 |
| 3843 | Dental Equipment & Supplies | 130 |
| 3851 | Ophthalmic Goods | 208 |
| 3861 | Photographic Equipment | 98 |
| 3873 | Watches/W'Case & Clocks | 74 |

**☐ 39 MISCELLANEOUS MANUFACTURING INDUSTRIES ..... 4,066**

| | | |
|---|---|---|
| 3911 | Jewelry, Precious Metal | 869 |
| 3914 | Silverware, Plated Ware | 56 |
| 3915 | Jewelers Materials & Lapidar | 69 |
| 3931 | Musical Instruments & Parts | 78 |
| 3942 | Dolls | 76 |
| 3944 | Games/Toys & Kids Veh. | 279 |
| 3949 | Athletic & Sporting Goods nec | 564 |
| 3951 | Pens & Mech. Pencils | 27 |
| 3952 | Lead Pencils & Art Goods | 52 |
| 3953 | Marking Devices | 136 |
| 3955 | Carbon Paper & Inked Ribbons | 32 |
| 3961 | Costume Jewelry | 213 |
| 3962 | Artificial Flowers | 34 |
| 3963 | Buttons | 29 |
| 3964 | Needles, Pins & Fasteners | 48 |
| 3991 | Brooms & Brushes | 80 |
| 3993 | Signs & Advertising Displays | 911 |
| 3995 | Burial Caskets | 56 |
| 3996 | Hard Surface Floor Coverings | 16 |
| 3999 | Manufacturing nec | 822 |

☐ 4011 thru 4971
TRANSPORTATION, COMMUNICATION, AND OTHER PUBLIC UTILITIES ... 45,532

**☐ 40 RAILROAD TRANSPORTATION ..... 95**

| | | |
|---|---|---|
| 4011 | Railroads, Line-Haul | 74 |
| 4013 | Switching & Terminal Co | 20 |
| 4041 | Railway Express Service | 1 |

**☐ 41 LOCAL PASSENGER TRANS ... 3,520**

| | | |
|---|---|---|
| 4111 | Local & Suburban Transportation | 254 |
| 4119 | Local Passenger Transportation | 585 |
| 4121 | Taxicabs | 805 |
| 4131 | Intercity Highway Transportation | 159 |
| 4141 | Local Passenger Charter | 148 |
| 4142 | Charter Services Except Local | 240 |
| 4151 | School Buses | 1,223 |
| 4171 | Bus Terminal Facilities | 84 |
| 4172 | Bus Service Facilities | 38 |

**☐ 42 TRUCKING AND WAREHOUSING ..... 28,553**

| | | |
|---|---|---|
| 4212 | Local Trucking Without Storage | 17,932 |
| 4213 | Trucking Except Local | 6,066 |
| 4214 | Local Trucking & Storage | 814 |
| 4221 | Farm Product Warehousing & Storing | 152 |
| 4222 | Refrigerated Warehousing | 209 |
| 4224 | Household Goods Warehousing | 97 |
| 4225 | General Warehousing & Storing | 539 |
| 4226 | Special Warehousing & Storing nec | 264 |
| 4231 | Trucking Terminal Fac | 81 |

**43 CANADIAN POSTAL SERVICE ..... 24**

| | | |
|---|---|---|
| 4311 | Canadian Postal Service | 24 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| **☐ 44** | **WATER TRANSPORTATION ..... 1,800** | |
| 4411 | Deep Sea Foreign Transportation | 38 |
| 4421 | Noncontiguous Area Transportation | 43 |
| 4422 | Coastwise Transportation | 41 |
| 4423 | Intercoastal Transportation | 11 |
| 4431 | Great Lakes Transportation | 27 |
| 4441 | Transportation On Rivers & Canals | 101 |
| 4452 | Ferries | 29 |
| 4453 | Lighterage | 5 |
| 4454 | Towing & Tugboat Services | 180 |
| 4459 | Local Water Transportation nec | 111 |
| 4463 | Marine Cargo Handling | 191 |
| 4464 | Canal Operation | 5 |
| 4489 | Water Transportation Services nec | 1,037 |
| **☐ 45** | **TRANSPORTATION BY AIR ..... 1,536** | |
| 4511 | Certificate Air Trans | 487 |
| 4521 | Non Certificate Air Trans | 515 |
| 4582 | Airports & Flying Fields | 471 |
| 4583 | Airport Terminal Services | 63 |
| **☐ 46** | **PIPE LINES TRANSPORTATION ... 85** | |
| 4612 | Crude Petroleum Pipe Lines | 51 |
| 4613 | Refined Petroleum Pipe Lines | 21 |
| 4619 | Pipe Lines nec | 13 |
| **☐ 47** | **TRANSPORTATION SERVICES . 5,568** | |
| 4713 | Freight Forwarding | 854 |
| 4722 | Passenger Transportation Arrangement | 3,053 |
| 4723 | Freight Cargo Transportation | 1,266 |
| 4741 | Railroad Car Rental With Service | 9 |
| 4743 | Railroad Car Rental Without Service | 5 |
| 4782 | Inspection & Weighing Services | 51 |
| 4783 | Packing & Crating | 103 |
| 4784 | Fix Fac. Vehicles nec | 8 |
| 4789 | Transportation Services | 139 |
| **☐ 48** | **COMMUNICATIONS ..... 1,642** | |
| 4811 | Telephone Communication | 181 |
| 4821 | Telegraph Communication | 22 |
| 4832 | Radio Broadcasting | 422 |
| 4833 | TV Broadcasting | 208 |
| 4899 | Communication Services nec | 811 |
| **☐ 49** | **ELECTRIC, GAS AND SANITARY SERVICES ..... 2,709** | |
| 4911 | Electric Company & Systems | 208 |
| 4922 | Natural Gas Transmission | 86 |
| 4923 | Gas Transmission & Distribution | 105 |
| 4924 | Natural Gas Distribution | 89 |
| 4925 | Gas Production Or Distribution | 33 |
| 4931 | Electric & Other Services Combined | 44 |
| 4932 | Gas & Other Services Combined | 23 |
| 4939 | Combination Co. & System nec | 2 |
| 4941 | Water Supply | 103 |
| 4952 | Sewerage Systems | 44 |
| 4953 | Refuse Systems | 138 |
| 4959 | Sanitary Services nec | 1,291 |
| 4961 | Steam Supply | 19 |
| 4971 | Irrigation Systems | 53 |

☐ 5012 thru 5199
WHOLESALE TRADE ..... 91,550

**☐ 50 WHOLESALE DURABLES ..... 56,846**

| | | |
|---|---|---|
| 5012 | Autos, & Motor Vehicles | 1,843 |
| 5013 | Automobile Equipment | 4,810 |
| 5014 | Tires & Tubes | 1,001 |
| 5021 | Furniture | 1,329 |
| 5023 | Home Furnishings | 2,212 |
| 5031 | Lumber, Plywood & Millwork | 2,084 |
| 5039 | Construction Materials | 3,117 |
| 5041 | Sporting & Recreational Goods | 1,562 |
| 5042 | Toys, Hobby Goods & Supplies | 771 |
| 5043 | Photo Equipment & Supplies | 319 |
| 5044 | Office Equipment | 1,333 |
| 5045 | Computers, Peripherals & Software | 1,027 |
| 5046 | Commercial Equipment nec | 1,117 |
| 5047 | Medical & Hospital Equipment | 2,031 |
| 5048 | Ophthalmic Goods | 1,524 |
| 5049 | Professional Equipment nec | 1,727 |
| 5051 | Metals Service Centers & Offices | 1,333 |
| 5052 | Coal, Minerals & Ores | 83 |
| 5063 | Electrical Apparatus & Equipment | 3,027 |
| 5064 | Electrical Appliances, TV & Radio | 1,117 |
| 5065 | Electronic Parts & Equipment | 2,031 |
| 5072 | Hardware | 1,524 |
| 5074 | Plumbing & Hydronic Supplies | 1,727 |
| 5075 | Warm Air Heat & Airconditioning | 564 |
| 5078 | Refrigeration Equipment & Supplies | 388 |
| 5081 | Commercial Machines & Equipment | 4,804 |
| 5082 | Construction & Mining Machinery | 1,244 |
| 5083 | Farm Machinery & Equipment | 3,349 |
| 5084 | Industrial Machinery & Equipment | 6,737 |
| 5085 | Industrial Supplies | 2,388 |
| 5086 | Professional Equipment & Supplies | 2,033 |
| 5087 | Service Establishment Equipment | 1,364 |
| 5088 | Transportation Equipment & Supplies | 805 |
| 5093 | Scrap & Waste Material | 967 |
| 5094 | Jewelry & Watches | 1,324 |
| 5099 | Durable Goods nec | 2,607 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTA |
|---|---|---|
| **☐ 51** | **WHOLESALE NON-DURABLES ..... 34,704** | |
| 5111 | Printing & Writing Paper | 247 |
| 5112 | Stationery & Supplies | 1,1 |
| 5113 | Industrial & Personal Service Paper | 7 |
| 5122 | Drugs, Drug Proprietaries | 1,22 |
| 5133 | Piece Goods | 1,1 |
| 5134 | Notions & Dry Goods | 374 |
| 5136 | Men's & Boys Clothing & Furnishings | 1,756 |
| 5137 | Women's & Kids Clothing & Accessories | 2,812 |
| 5139 | Footwear | 5 |
| 5141 | Groceries, General Line | 2,2 |
| 5142 | Frozen Foods | 5 |
| 5143 | Dairy Products | 8 |
| 5144 | Poultry & Poultry Products | 9 |
| 5145 | Confectionery | 854 |
| 5146 | Fish & Seafoods | 1,511 |
| 5147 | Meat & Meat Products | 1,1 |
| 5148 | Fresh Fruits & Vegetables | 8 |
| 5149 | Groceries & Related Products | 1,3 |
| 5152 | Cotton | |
| 5153 | Grain | |
| 5154 | Livestock | 358 |
| 5159 | Farm Product Raw Materials | 281 |
| 5161 | Chemicals & Allied Products | 2,064 |
| 5171 | Petroleum Bulk Depots & Term | 1,4 |
| 5172 | Petroleum Products | 1,1 |
| 5181 | Beer & Ale | 3 |
| 5182 | Wines & Distilled Alcoholic Bev | 3 |
| 5191 | Farm Supplies | 2,6 |
| 5194 | Tobacco & Tobacco Products | 228 |
| 5198 | Paints, Varnishes & Supplies | 615 |
| 5199 | Nondurable Goods nec | 5,5 |

☐ 5211 thru 5999
RETAIL TRADE ..... 256,

**☐ 52 BUILDING MATERIALS, HARDWARE, GARDEN SUPPLY AND MOBILE HOME DEALERS ..... 18,578**

| | | |
|---|---|---|
| 5211 | Lumber & Building Materials | 6,4 |
| 5231 | Hardware & Wallpaper Stores | 2,9 |
| 5251 | Hardware Stores | 5,5 |
| 5261 | Retail Nurseries & Garden Stores | 2,1 |
| 5271 | Mobile Home Dealers | 353 |

**☐ 53 GENERAL MERCHANDISE ..... 9,8**

| | | |
|---|---|---|
| 5311 | Department Stores | 1,0 |
| 5331 | Variety Stores | 3,2 |
| 5399 | Misc. General Merchandise Stores | 5,4 |

**☐ 54 FOOD STORES ..... 32,940**

| | | |
|---|---|---|
| 5411 | Grocery Stores | 21,4 |
| 5422 | Freezer & Meat Provisions | 2 |
| 5423 | Meat & Fish (Seafood) Markets | 2,8 |
| 5431 | Fruit Stores & Vegetable Markets | 1,0 |
| 5441 | Candy, Nut & Confectionery Store | 1,3 |
| 5451 | Dairy Products Stores | 481 |
| 5462 | Retail Bakeries — Baking & Selling | 3,458 |
| 5463 | Retail Bakeries — Selling Only | 2 |
| 5499 | Miscellaneous Food Store | 1,3 |

**☐ 55 AUTO DEALERS AND SERVICE STATIONS ..... 36,5**

| | | |
|---|---|---|
| 5511 | New & Used Car Dealers | 5,533 |
| 5521 | Used Car Dealers | 2,4 |
| 5531 | Auto Home Supply Stores | 6,1 |
| 5541 | Gasoline Service Stations | 16,7 |
| 5551 | Boat Dealers | 1,8 |
| 5561 | Utility Trailer Dealers | 3 |
| 5571 | Motorcycle Dealers | 1,241 |
| 5599 | Recreational Vehicle Dealers nec | 1,841 |

**☐ 56 APPAREL AND ACCESSORY STORES ..... 31,2**

| | | |
|---|---|---|
| 5611 | Men's & Boys Clothing | 4,7 |
| 5621 | Women's Ready-To-Wear Stores | 10,967 |
| 5631 | Women's Accessory & Specialty Store | 2,743 |
| 5641 | Children's & Infants' Wear Stores | 1,979 |
| 5651 | Family Clothing Stores | 3,1 |
| 5661 | Shoe Stores | 3,8 |
| 5681 | Furriers & Fur Shops | 6 |
| 5699 | Misc Apparel & Accessory Store | 3,3 |

**☐ 57 FURNITURE, HOME FURNISHINGS AND EQUIPMENT STORES ... 29,5**

| | | |
|---|---|---|
| 5712 | Furniture Stores | 6,3 |
| 5713 | Floor Covering Stores | 3,0 |
| 5714 | Drapery & Upholstery Stores | 1,2 |
| 5719 | Misc Home Furnishing Stores | 4,1 |
| 5722 | Household Appliance Stores | 4,4 |
| 5731 | Personal Computers | 809 |
| 5732 | Radio & Television Stores | 6,3 |
| 5733 | Music Stores | 2,6 |

**☐ 58 EATING AND DRINKING PLACES ..... 43,837**

| | | |
|---|---|---|
| 5812 | Eating Places | 36,934 |
| 5813 | Drinking Places | 6,9 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐1061 | Ferroalloy Ores | 48 |
| ☐1081 | Metal Mining svcs | 984 |
| ☐1082 | Mercury Ores | 1 |
| ☐1094 | Uranium-Radium Ore | 42 |
| ☐1099 | Metal Ores, nec | 57 |
| ☐ 11 | ANTHRACITE MINING | 14 |
| ☐1111 | Anthracite | 10 |
| ☐1112 | Anthracite Mining | 4 |
| ☐ 12 | BITUMINOUS COAL AND LIGNITE MINING | 95 |
| ☐1211 | Bituminous Coal Lignite | 81 |
| ☐1213 | Bituminous Coal, nec | 14 |
| ☐ 13 | OIL AND GAS EXTRACTION | 5,725 |
| ☐1311 | Crude Oil & Nat. Gas | 1,887 |
| ☐1321 | Natural Gas Liquids | 45 |
| ☐1381 | Drilling Oil, Gas Wells | 529 |
| ☐1382 | Oil, Gas Exploration Svcs | 1,472 |
| ☐1389 | Oil, Gas Fld Svcs nec | 2,542 |
| ☐ 14 | NM MINERALS EX FUELS | 1,070 |
| ☐1411 | Dimension Stone | 44 |
| ☐1422 | Crushed & Broken Limestone | 77 |
| ☐1423 | Crushed & Broken Granite | 26 |
| ☐1429 | Crushed & Broken Stone nec | 55 |
| ☐1442 | Construction Sand & Gravel | 424 |
| ☐1446 | Industrial Sand | 22 |
| ☐1452 | Bentonite | 1 |
| ☐1453 | Fire Clay | 2 |
| ☐1459 | Clay & Related Minerals | 13 |
| ☐1472 | Barite | 4 |
| ☐1473 | Fluorspar | 3 |
| ☐1474 | Potash Soda, Borate Minerals | 25 |
| ☐1475 | Phosphate Rock | 1 |
| ☐1476 | Rock Salt | 6 |
| ☐1477 | Sulfur | 7 |
| ☐1479 | Chem, Fertilizer, Mineral Mining, Nec | 4 |
| ☐1481 | Nonmetallic Minerals Services | 175 |
| ☐1482 | Gypsum | 16 |
| ☐1496 | Talc Soapstone, pyrophyllite | 7 |
| ☐1499 | Nonmetallic Minerals nec | 158 |

☐ 1521 thru 1799 CONSTRUCTION 106,978

| | | |
|---|---|---|
| ☐ 15 | GENERAL BUILDING CONTRACTORS | 53,747 |
| ☐1521 | 1-Family Housing Construction | 17,311 |
| ☐1522 | Residential Construction | 3,911 |
| ☐1531 | Operative Builders | 2,588 |
| ☐1541 | Ind Bldgs & Warehouses | 3,469 |
| ☐1542 | Nonres. Constrn, nec | 6,468 |
| ☐ 16 | HEAVY CONSTRUCTION CONTRACTORS | 9,101 |
| ☐1611 | Hwy & Street Construction | 3,839 |
| ☐1622 | Bridge, Tunnel & Elevated Hwy Constr. | 433 |
| ☐1623 | Water Sewer & Utility | 1,881 |
| ☐1629 | Heavy Construction, nec | 2,948 |
| ☐ 17 | SPECIAL TRADE CONTRACTORS | 64,130 |
| ☐1711 | Plbg, Heatg, Air Cond | 14,058 |
| ☐1721 | Paint, Paper Hanging & Decorating | 3,440 |
| ☐1731 | Electrical Work | 11,575 |
| ☐1741 | Masonry, Other Stonework | 2,[illegible] |
| ☐1742 | Plstrg Drywall Insul | 3,886 |
| ☐1743 | Terrazzo, Tile, Marble & Mosaic Work | 880 |
| ☐1751 | Carpentering | 3,570 |
| ☐1752 | Floor Laying, Floor Work, Nec | 2,213 |
| ☐1761 | Roofing & Sheet Metal Work | 4,177 |
| ☐1771 | Concrete Work | 1,741 |
| ☐1781 | Water Well Drilling | 463 |
| ☐1791 | Structural Steel Erection | 777 |
| ☐1793 | Glass & Glazing Work | 986 |
| ☐1794 | Excavating & Foundation Work | 7,730 |
| ☐1795 | Wrecking & Demolition Work | 313 |
| ☐1796 | Install'g Bldg. Equip | 722 |
| ☐1799 | Special Trade Contractors | 6,864 |

2011 thru 3999 MANUFACTURING 82,494

| | | |
|---|---|---|
| ☐ 20 | FOOD AND KINDRED PRODUCTS | 5,904 |
| ☐2011 | Meat Packing Plants | 446 |
| ☐2013 | Sausages & Prep. Meats | 728 |
| ☐2016 | Poultry Dressing Plants | 73 |
| ☐2017 | Poultry & Egg Processing | 76 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐2021 | Creamery Butter | 104 |
| ☐2022 | Cheese, Natural & Processed | 167 |
| ☐2023 | Condensed & Evaporated Milk | 72 |
| ☐2024 | Ice Cream & Frozen Desserts | 109 |
| ☐2026 | Fluid Milk | 204 |
| ☐2032 | Canned Specialties | 114 |
| ☐2033 | Canned Fruits & Vegetables | 190 |
| ☐2034 | Dehydrated Food Products | 70 |
| ☐2035 | Pickl, Sauces, Salad Dressings | 105 |
| ☐2037 | Frozen Fruits & Vegetables | 58 |
| ☐2038 | Frozen Specialties | 134 |
| ☐2041 | Flour, Grain Mill Products | 117 |
| ☐2043 | Cereal Preparations | 29 |
| ☐2044 | Rice Milling | 8 |
| ☐2045 | Blended & Prepared Flour | 45 |
| ☐2046 | Wet Corn Milling | 16 |
| ☐2047 | Dog, Cat & Other Pet Food | 85 |
| ☐2048 | Prepared Feeds Nec | 324 |
| ☐2051 | Bread, Cake, Re Pds | 256 |
| ☐2052 | Cookies & Crackers | 98 |
| ☐2061 | Raw Cane Sugar | 3 |
| ☐2062 | Cane Sugar Refining | 13 |
| ☐2063 | Beet Sugar | 6 |
| ☐2066 | Confectionery Products | 245 |
| ☐2068 | Chocolate & Cocoa Products | 44 |
| ☐2067 | Chewing Gum | 8 |
| ☐2074 | Cottonseed Oil Mills | 1 |
| ☐2075 | Soybean Oil Mills | 14 |
| ☐2076 | Vegetable Oil Mills | 16 |
| ☐2077 | Animal & Sea Fats & Oil | 36 |
| ☐2079 | Lard & Cooking Oils | 47 |
| ☐2082 | Malt Liquors | 105 |
| ☐2083 | Malt | 12 |
| ☐2084 | Wines, Brandy & Brandy Spirits | 78 |
| ☐2085 | Dist Liquor Ex Brand | 48 |
| ☐2086 | Bottled & Canned Soft Drinks | 275 |
| ☐2087 | Flavoring Extracts & Syrups nec | 88 |
| ☐2091 | Canned & Cured Seafoods | 351 |
| ☐2092 | Fresh/Frozen Fish | 368 |
| ☐2095 | Roasted Coffee | 90 |
| ☐2097 | Manufactured Ice | 89 |
| ☐2098 | Macaroni, Spaghetti | 116 |
| ☐2099 | Food Preparations nec | 419 |
| ☐ 21 | TOBACCO MANUFACTURERS | 34 |
| ☐2111 | Cigarettes | 13 |
| ☐2121 | Cigars | 8 |
| ☐2131 | Chewing & Smoking Tobacco | 10 |
| ☐2141 | Tobacco Stemming & Redrying | 3 |
| ☐ 22 | TEXTILE MILL PRODUCTS | 1,843 |
| ☐2211 | Weaving Mills, Cotton | 263 |
| ☐2221 | Weaving Mills, Synthetics | 237 |
| ☐2231 | Weaving, Finish Mills, Wool | 74 |
| ☐2241 | Narrow Fabric Mills | 98 |
| ☐2251 | Women's Hosiery | 58 |
| ☐2252 | Hosiery, nec | 51 |
| ☐2253 | Knit Outerwear Mills | 299 |
| ☐2254 | Knit Underwear Mills | 53 |
| ☐2257 | Circular Knit Fabric Mills | 46 |
| ☐2258 | Warp Knit Fabric Mills | 39 |
| ☐2259 | Knitting Mills, Nec | 50 |
| ☐2261 | Finishing Plants Cotton | 84 |
| ☐2262 | Finishing Plants Synthetics | 42 |
| ☐2269 | Finishing Plants Nec | 75 |
| ☐2271 | Woven Carpets, Rugs | 41 |
| ☐2272 | Tufted Carpets, Rugs | 32 |
| ☐2279 | Carpets, Rugs Nec | 16 |
| ☐2281 | Yarn Mills Ex Wool | 47 |
| ☐2282 | Throwing, Winding Mills | 12 |
| ☐2283 | Wool Yarn Mills | 47 |
| ☐2284 | Thread Mills | 22 |
| ☐2291 | Felt Goods nec | 18 |
| ☐2292 | Lace Goods | 16 |
| ☐2293 | Paddings & Upholstery Fillings | 14 |
| ☐2294 | Processed Textile Waste | 16 |
| ☐2295 | Coated Fabric, Not Rubberized | 26 |
| ☐2296 | Tire Cord & Fabric | 7 |
| ☐2297 | Nonwoven Fabrics | 19 |
| ☐2298 | Cordage, Twine | 78 |
| ☐2299 | Textile Goods nec | 89 |
| ☐ 23 | APPAREL AND RELATED PRODUCTS | 6,058 |
| ☐2311 | Mens and Boys Suits | 241 |
| ☐2321 | Mens & Boys Nightwear | 203 |
| ☐2322 | Mens & Boys Underwear | 82 |
| ☐2323 | Mens & Boys Neckwear | 48 |
| ☐2327 | Mens & Boys Trousers | 97 |
| ☐2328 | Mens & Boys Clothing | 167 |
| ☐2329 | Mens & Boys Clothing | 668 |
| ☐2331 | Womens & Misses Blouses | 234 |
| ☐2335 | Womens & Misses Dresses | 575 |
| ☐2337 | Womens & Misses Suits | 322 |
| ☐2339 | Womens & Misses Outerwear | 260 |
| ☐2341 | Womens & Childrens Underwear | 154 |
| ☐2342 | Corsets & Garments | 44 |
| ☐2351 | Millinery | 16 |
| ☐2352 | Hats & Caps | 80 |
| ☐2361 | Childrens Dresses | 122 |
| ☐2363 | Childrens Coats | 56 |
| ☐2369 | Childrens Outerwear | 130 |
| ☐2371 | Fur Goods | 323 |
| ☐2381 | Fabric Dress & Glove | 25 |
| ☐2384 | Robes & Dressing Gowns | 20 |
| ☐2385 | Waterproof Garments | 36 |
| ☐2386 | Leather Lined Cloths | 178 |
| ☐2387 | Apparel Belts | 60 |
| ☐2389 | Apparel & Accessories | 143 |
| ☐2391 | Curtains & Draperies | 285 |
| ☐2392 | Housefurnishings nec | 263 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐2393 | Textile Bags | 42 |
| ☐2394 | Canvas Products | 316 |
| ☐2395 | Pleating & Stitching | 95 |
| ☐2396 | Apparel Findings | 124 |
| ☐2399 | Fabricated Textile Pds nec | 202 |
| ☐ 24 | LUMBER AND WOOD PRODUCTS | 12,442 |
| ☐2411 | Logging Camps & Contractors | 4,476 |
| ☐2421 | Sawmills, Planning Mills & General | 1,662 |
| ☐2426 | Hardwood Floor & Part | 186 |
| ☐2429 | Special Product Sawmills nec | 151 |
| ☐2431 | Millwork | 1,712 |
| ☐2434 | Wood Kitchen Cabinets | 2,838 |
| ☐2435 | Hardwood Veneer Plywood | 97 |
| ☐2436 | Softwood Veneer Plywood | 51 |
| ☐2438 | Structural Wood Members | 228 |
| ☐2441 | Nail Wooden Boxes, Shook | 85 |
| ☐2448 | Wood Pallets & Skids | 248 |
| ☐2449 | Wood Containers, nec | 98 |
| ☐2451 | Mobile Homes | 54 |
| ☐2452 | Prefab. Wooden Buildings | 211 |
| ☐2491 | Wood Preserving | 112 |
| ☐2492 | Particleboard | 27 |
| ☐2499 | Wood Products, nec | 979 |
| ☐ 25 | FURNITURE AND FIXTURES | 4,745 |
| ☐2511 | Wood Household Furn | 1,536 |
| ☐2512 | Upholstered Household Furn | 852 |
| ☐2514 | Metal Household Furn | 177 |
| ☐2515 | Mattresses & Bedsprings | 168 |
| ☐2517 | Wood TV, Radio & Cabinets | 65 |
| ☐2519 | Household Furn, nec | 330 |
| ☐2521 | Wood Office Furniture | 391 |
| ☐2522 | Metal Office Furniture | 148 |
| ☐2531 | Public Bldg. Furniture | 113 |
| ☐2541 | Wood Partitions, Fixtures | 442 |
| ☐2542 | Metal Partitions, Fixtures | 261 |
| ☐2591 | Venetian Blinds, Shades | 240 |
| ☐2599 | Furniture, Fixtures nec | 219 |
| ☐ 26 | PAPER AND ALLIED PRODUCTS | 1,475 |
| ☐2611 | Pulp Mills | 119 |
| ☐2621 | Paper Mills, Ex Bldg. Pp | 173 |
| ☐2631 | Paperboard Mills | 92 |
| ☐2641 | Paper Coating & Glazing | 120 |
| ☐2642 | Envelopes | 61 |
| ☐2643 | Bags, Except Textile Bags | 177 |
| ☐2645 | Die Cut Paper & Cardboard | 98 |
| ☐2646 | Press & Molded Pulp Goods | 78 |
| ☐2647 | Sanitary Paper Products | 48 |
| ☐2648 | Stationery Products | 42 |
| ☐2649 | Converted Paper Products | 156 |
| ☐2651 | Folding Paperboard Boxes | 116 |
| ☐2652 | Setup Paperboard Boxes | 39 |
| ☐2653 | Corrugated & Solid Fiber Boxes | 167 |
| ☐2654 | Sanitary Food Containers | 17 |
| ☐2655 | Fiber Cans, Drums, etc | 45 |
| ☐2661 | Bldg Paper, Board Mills | 61 |
| ☐ 27 | PRINTING AND PUBLISHING | 9,486 |
| ☐2711 | Newspapers | 1,028 |
| ☐2721 | Periodicals | 756 |
| ☐2731 | Book Publishing | 884 |
| ☐2732 | Book Printing | 160 |
| ☐2741 | Miscellaneous Publishing | 253 |
| ☐2751 | Commercial Letterhead Printing | 2,166 |
| ☐2752 | Commercial Litho Printing | 2,107 |
| ☐2753 | Engraving, Plate Printing | 156 |
| ☐2754 | Commercial Gravure Printing | 279 |
| ☐2759 | Commercial Printing | 21 |
| ☐2761 | Manifold Business Forms | 119 |
| ☐2771 | Greeting Card Publishing | 37 |
| ☐2782 | Blankbooks, Looseleaf Binders | 100 |
| ☐2789 | Bookbinding & Related Work | 240 |
| ☐2791 | Typesetting | 447 |
| ☐2793 | Photoengraving | 30 |
| ☐2794 | Electro Usg, Stereotyping | 4 |
| ☐2795 | Lithe Platemaking Services | 57 |
| ☐ 28 | CHEMICALS AND ALLIED PRODUCTS | 3,315 |
| ☐2812 | Alkalies & Chlorine | 36 |
| ☐2813 | Industrial Gases | 83 |
| ☐2816 | Inorganic Pigments | 74 |
| ☐2819 | Industrial Inorganic Chemicals | 386 |
| ☐2821 | Plastics Material | 274 |
| ☐2822 | Synthetic Rubber | 28 |
| ☐2823 | Cellulosic Man-Made Fibers | 16 |
| ☐2824 | Organic Fibers | 34 |
| ☐2831 | Biological Products | 36 |
| ☐2833 | Medicinal Chemicals & Botanicals Products | 82 |
| ☐2834 | Pharmaceutical Preparations | 267 |
| ☐2841 | Soap & Other Detergents | 215 |
| ☐2842 | Polishes & Sanitary | 101 |
| ☐2843 | Surface Active Agents | 14 |
| ☐2844 | Toilet Preparations | 250 |
| ☐2851 | Paints & Allied Products | 288 |
| ☐2861 | Gum & Wood Chemicals | 24 |
| ☐2865 | Cyclic Crudes, Intermed | 29 |
| ☐2869 | Industrial Organic Chemicals | 132 |
| ☐2873 | Nitrogenous Fertilizer | 66 |
| ☐2874 | Phosphatic Fertilizer | 56 |
| ☐2875 | Mixing Fertilizers | 73 |
| ☐2879 | Agricultural Chemicals | 81 |
| ☐2891 | Adhesives & Sealants | 152 |
| ☐2892 | Explosives | 29 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐2893 | Printing Ink | 67 |
| ☐2895 | Carbon Black | 6 |
| ☐2899 | Chemical Preparations | 327 |
| ☐ 29 | PETROLEUM AND COAL PRODUCTS | 413 |
| ☐2911 | Petroleum Refining | 130 |
| ☐2951 | Paving Mixtures & Blocks | 115 |
| ☐2952 | Asphalt Felts & Coatings | 62 |
| ☐2992 | Lubricating Oils & Greases | 97 |
| ☐2999 | Petroleum & Coal Pds nec | 6 |
| ☐ 30 | RUBBER AND PLASTICS | 2,325 |
| ☐3011 | Tires & Inner Tubes | 50 |
| ☐3021 | Rubber & Plastic Footwear | 18 |
| ☐3031 | Reclaimed Rubber | 9 |
| ☐3041 | Rubber & Plastic Hoses | 52 |
| ☐3069 | Fabricated Rubber Products | 276 |
| ☐3079 | Miscellaneous Plastic Products | 1,922 |
| ☐ 31 | LEATHER & LEATHER PRODUCTS | 990 |
| ☐3111 | Leather Tanning & Finishing | 81 |
| ☐3131 | Footwear Cut Stock | 43 |
| ☐3142 | House Slippers | 25 |
| ☐3143 | Mens Shoes Except Athletic | 130 |
| ☐3144 | Ladies Shoes Except Athletic | 134 |
| ☐3149 | Footwear Except Rubber nec | 61 |
| ☐3151 | Leather Gloves & Mittens | 32 |
| ☐3161 | Luggage | 29 |
| ☐3171 | Womens Handbags | 98 |
| ☐3172 | Personal Leather Goods | 126 |
| ☐3199 | Leather Goods nec | 175 |
| ☐ 32 | STONE, CLAY, GLASS AND CONCRETE PRODUCTS | 3,422 |
| ☐3211 | Flat Glass | 97 |
| ☐3221 | Glass Containers | 25 |
| ☐3229 | Pressed & Blown Glass nec | 107 |
| ☐3231 | Glass Products Made Of Purchase Glass | 291 |
| ☐3241 | Cement, Hydraulic | 80 |
| ☐3251 | Brick & Structural Clay Tile | 81 |
| ☐3253 | Ceramic Wall & Floor Tile | 43 |
| ☐3255 | Clay Refractories | 35 |
| ☐3259 | Structural Clay Products nec | 34 |
| ☐3261 | Vitreous Plumbing Fixtures | 30 |
| ☐3262 | Vitreous China Fd Utensil | 9 |
| ☐3263 | Earthenware Food Utensils | 10 |
| ☐3264 | Porcelain Electrical Supplies | 16 |
| ☐3269 | Pottery Products Nec | 229 |
| ☐3271 | Concrete Block & Brick | 375 |
| ☐3272 | Concrete Products Nec | 858 |
| ☐3273 | Ready-Mixed Concrete | 838 |
| ☐3274 | Lime | 24 |
| ☐3275 | Gypsum Products | 38 |
| ☐3281 | Cut Stone & Stone Products | 280 |
| ☐3291 | Abrasive Products | 44 |
| ☐3292 | Asbestos Products | 49 |
| ☐3293 | Gaskets, Packing & Sealing Devices | 52 |
| ☐3295 | Ground Or Treated Minerals | 38 |
| ☐3296 | Mineral Wool | 57 |
| ☐3297 | Nonclay Refractories | 34 |
| ☐3299 | Nonmetal Mineral Products nec | 260 |
| ☐ 33 | PRIMARY METAL INDUSTRIES | 1,618 |
| ☐3312 | Blast Furnaces & Steel Mills | 345 |
| ☐3313 | Electrometallurgical Products | 11 |
| ☐3315 | Steel Wire, Re Products | 70 |
| ☐3316 | Cold Finishing Steel Shap | 61 |
| ☐3317 | Steel Pipes & Tubes | 56 |
| ☐3321 | Gray Iron Foundries | 102 |
| ☐3322 | Malleable Iron Foundries | 21 |
| ☐3324 | Steel Investment Foundries | 14 |
| ☐3325 | Steel Foundries nec | 35 |
| ☐3331 | Primary Copper | 10 |
| ☐3332 | Primary Lead | 5 |
| ☐3333 | Primary Zinc | 6 |
| ☐3334 | Primary Aluminum | 28 |
| ☐3339 | Prime Nonferrous Metals nec | 38 |
| ☐3341 | Sec. Nonferrous Metals | 85 |
| ☐3351 | Copper Rolling, Drawing | 73 |
| ☐3353 | Aluminum Sheet, Plate & Foil | 33 |
| ☐3354 | Aluminum Extruded Products | 31 |
| ☐3356 | Aluminum Rolling & Drawing | 25 |
| ☐3356 | Rolling, Drawing Nec | 25 |
| ☐3357 | Nonferrous Wire & Drawing | 38 |
| ☐3361 | Aluminum Castings | 145 |
| ☐3362 | Brass, Bronze & Copper Castings | 94 |
| ☐3369 | Metal Heat Treating | 85 |
| ☐3398 | Metal Heat Treating | 85 |
| ☐3399 | Primary Metal Products | 99 |
| ☐ 34 | FABRICATED METAL PRODUCTS | 7,830 |
| ☐3411 | Metal Cans | 42 |
| ☐3412 | Metal Drums & Pails | 44 |
| ☐3421 | Cutlery | 25 |
| ☐3423 | Edge Tools | 138 |
| ☐3425 | Hand Saws & Saw Blades | 54 |
| ☐3429 | Hardware nec | 367 |
| ☐3431 | Metal Sanitary Ware | 66 |
| ☐3432 | Plumbing Fixtures & Brass Goods | 32 |
| ☐3433 | Heating Equipment Except Electric | 260 |
| ☐3441 | Fabricated Structural Steel | 533 |
| ☐3442 | Metal Door Sash Trim | 721 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐ 59 | **MISCELLANEOUS RETAIL STORES** | 55,045 |
| ☐5912 | Drug & Proprietary Stores | 5,022 |
| ☐5921 | Liquor Stores | 433 |
| ☐5931 | Used Merchandise Stores | 2,848 |
| ☐5941 | Sporting Goods & Bicycle Stores | 6,230 |
| ☐5942 | Book Stores | 1,548 |
| ☐5943 | Stationery Stores | 1,840 |
| ☐5944 | Jewelry Stores | 4,478 |
| ☐5945 | Hobby, Toy & Game Shops | 1,481 |
| ☐5946 | Photographic Supply Stores | 1,080 |
| ☐5947 | Gift & Novelty Shops | 7,319 |
| ☐5948 | Leather Products Stores | 467 |
| ☐5949 | Sewing & Needlework Pces | 3,835 |
| ☐5961 | Mail Order Houses | 635 |
| ☐5962 | Vending Machine Operators | 610 |
| ☐5963 | Direct Selling Establishments | 722 |
| ☐5982 | Fuel & Ice Dealers nec | 170 |
| ☐5983 | Fuel & Oil Dealers | 1,286 |
| ☐5984 | Bottle Gas Dealers | 330 |
| ☐5992 | Florists | 2,808 |
| ☐5993 | Cigar Stores & Stands | 1,045 |
| ☐5994 | News Dealers & Newsstands | 411 |
| ☐5999 | Miscellaneous Retail Stores | 10,704 |

| | | |
|---|---|---|
| ☐6011 thru 6799 | FINANCE, INSURANCE AND REAL ESTATE | 69,585 |

| | | |
|---|---|---|
| ☐ 60 | **BANKING** | 1,014 |
| ☐6011 | Central Bank | 28 |
| ☐6022 | Provincial Banks | 80 |
| ☐6023 | Trust Companies | 3 |
| ☐6025 | Federal Banks | 586 |
| ☐6042 | Non Deposit Trusts | 237 |
| ☐6052 | Foreign Exchange Clgs | 18 |
| ☐6054 | Safe Deposit Company | 1 |
| ☐6056 | Corp For Bank Abroad | 2 |
| ☐6059 | Functions Related Bank | 38 |
| ☐ 61 | **CREDIT AGENCIES EXCEPT BANKS** | 2,234 |
| ☐6113 | Dep. Mortgage Co. | 44 |
| ☐6119 | Postsecondary For Agriculture | 3 |
| ☐6122 | Federal Savings & Loan | 6 |
| ☐6125 | Provincial Associations | 8 |
| ☐6131 | Agricultural Credit | 12 |
| ☐6142 | Federal Credit Union | 88 |
| ☐6143 | Provincial Credit Unions | 285 |
| ☐6144 | Non Deposit Industrial Loan Companies | 54 |
| ☐6145 | Licensed Small Loan Lenders | 94 |
| ☐6146 | Installment Sale Finance Companies | 124 |
| ☐6149 | Misc Personal Credit Inst | 15 |
| ☐6153 | Short-Term Business Credit Companies | 113 |
| ☐6159 | Misc Business Credit Inst | 618 |
| ☐6162 | Mortgage Bankers & Loan Correspondents | 468 |
| ☐6163 | Loan Brokers | 282 |
| ☐ 62 | **SECURITY AND COMMODITY BROKERS AND SERVICES** | 1,551 |
| ☐6211 | Security Brokers & Dealers | 812 |
| ☐6221 | Commodity Contract Brokers & Dealers | 217 |
| ☐6231 | Security & Commodity | 34 |
| ☐6261 | Security Services | 488 |
| ☐ 63 | **INSURANCE CARRIERS** | 1,367 |
| ☐6311 | Life Insurance | 633 |
| ☐6321 | Accident Health Insurance | 156 |
| ☐6324 | Hospital Service Plans | 38 |
| ☐6331 | Fire, Sea & Casualty Insurance | 381 |
| ☐6351 | Surety Companies | 151 |
| ☐6361 | Title Insurance | 23 |
| ☐6371 | Pension Health Funds | 85 |
| ☐6399 | Insurance Carriers | 9 |
| ☐ 64 | **INSURANCE AGENTS, BROKERS AND SERVICES** | 5,965 |
| ☐6411 | Insurance Agents, Brokers & Svc | 5,965 |
| ☐ 65 | **REAL ESTATE** | 31,223 |
| ☐6512 | Non Residential Buildngs | 10,753 |
| ☐6513 | Apartment Buildings | 6,942 |
| ☐6514 | Dwelling Operators | 1,885 |
| ☐6515 | Mobile Homes Sites Operators | 364 |
| ☐6517 | Railroad Lessors | 8 |
| ☐6519 | Real Property Lessors | 477 |
| ☐6531 | Agents, Brokers & Managers | 6,852 |
| ☐6541 | Title Abstract Co | 38 |
| ☐6552 | Subdivders & Developers | 1,070 |
| ☐6553 | Cemetery Subdivders & Developers | 94 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐ 66 | **COMBINATIONS OF REAL ESTATE, INSURANCE, LAW** | 246 |
| ☐6611 | Comb of Real Estate, Insurance, Law | 246 |
| ☐ 67 | **HOLDING AND OTHER INVESTMENT COMPANIES** | 25,965 |
| ☐6711 | Holding Companies | 23,814 |
| ☐6722 | Management Investment Open-End | 224 |
| ☐6723 | Management Investment Closed-End | 170 |
| ☐6724 | Unit Investments | 31 |
| ☐6725 | Face Amount Certificates | 10 |
| ☐6732 | Educ, Rel, Etc Trusts | 87 |
| ☐6733 | Trusts, nec | 115 |
| ☐6792 | Oil Royalty Companies | 74 |
| ☐6793 | Commodity Trading Co. | 155 |
| ☐6794 | Patent Owners & Lessors | 885 |
| ☐6798 | Real Estate Investment Trusts | 93 |

| | | |
|---|---|---|
| ☐7011 thru 8999 | SERVICES | 183,765 |

| | | |
|---|---|---|
| ☐ 70 | **HOTELS, ROOMING HOUSES, CAMPS AND OTHER LODGING PLACES** | 12,508 |
| ☐7011 | Hotels, Inns & Tourist Courts | 10,243 |
| ☐7021 | Rooming & Boarding Houses | 287 |
| ☐7032 | Sports & Amusement Camps | 825 |
| ☐7033 | Trailer Parks For Trans | 1,071 |
| ☐7041 | Membership Hotels, Lodging Houses | 74 |
| ☐ 72 | **PERSONAL SERVICES** | 16,834 |
| ☐7211 | Power Laundries, F Cons | 251 |
| ☐7212 | Garment Cleaners & Agents | 347 |
| ☐7213 | Linen Supply | 172 |
| ☐7214 | Diaper Service | 23 |
| ☐7215 | Coin Laundry & Cleaners | 1,024 |
| ☐7216 | Dry Cleaning Plants Ex Rug | 2,008 |
| ☐7217 | Carpet & Upholstery Cleaning | 904 |
| ☐7218 | Industrial Launderers | 166 |
| ☐7219 | Laundry & Garment Service | 624 |
| ☐7221 | Photographic Studios | 1,476 |
| ☐7231 | Beauty Shops | 4,923 |
| ☐7241 | Barber Shops | 753 |
| ☐7251 | Shoe Repair Shops | 505 |
| ☐7261 | Funeral Service | 1,222 |
| ☐7299 | Miscellaneous Personal Services | 2,076 |
| ☐ 73 | **BUSINESS SERVICES** | 52,349 |
| ☐7311 | Advertising Agency | 1,908 |
| ☐7312 | Outdoor Advertising Services | 169 |
| ☐7313 | Radio & TV Ad Reps | 184 |
| ☐7319 | Miscellaneous Advertising | 450 |
| ☐7321 | Credit Reporting & Collection | 338 |
| ☐7331 | Direct Mail Advertising | 298 |
| ☐7332 | Blueprinting & Photocopying | 436 |
| ☐7333 | Commercial Photography & Art | 3,878 |
| ☐7338 | Stenc & Duplicating Services nec | 340 |
| ☐7341 | Window Cleaning | 228 |
| ☐7342 | Disinfecting & Exterminating Services | 233 |
| ☐7349 | Misc Building Services | 3,486 |
| ☐7361 | News Syndicates | 82 |
| ☐7361 | Employment Agencies | 883 |
| ☐7362 | Temporary Aid Supply Services | 234 |
| ☐7369 | Employment Services nec | 68 |
| ☐7372 | Computer Programming | 2,887 |
| ☐7374 | Data Processing Service | 912 |
| ☐7379 | Computer Related Services | 2,171 |
| ☐7391 | Research & Development Labs | 843 |
| ☐7392 | Management & Public Relations | 14,789 |
| ☐7393 | Detective & Protective Services | 842 |
| ☐7394 | Equipment Rental & Leasing | 6,567 |
| ☐7396 | Photofinishing Labs | 1,853 |
| ☐7398 | Trading Stamp Services | 3 |
| ☐7397 | Commercial Testing Laboratories | 297 |
| ☐7399 | Business Services | 10,329 |
| ☐ 75 | **AUTOMOTIVE REPAIR** | 33,502 |
| ☐7512 | Passenger Car Rental | 1,672 |
| ☐7513 | Truck Rental & Lease | 1,103 |
| ☐7519 | Utility, House Trailer Rent | 411 |
| ☐7523 | Parking Lots | 142 |
| ☐7525 | Parking Structures | 33 |
| ☐7531 | Top & Body Repair Shops | 6,549 |
| ☐7534 | Tire Retreading & Repair Shops | 820 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐7535 | Paint Shops | 1,255 |
| ☐7538 | General Auto Repair Shops | 13,644 |
| ☐7539 | Auto Repair Shops nec | 4,716 |
| ☐7542 | Car Washes | 1,485 |
| ☐7549 | Automotive Services nec | 1,512 |
| ☐ 76 | **MISCELLANEOUS REPAIR SERVICES** | 25,284 |
| ☐7622 | Radio & TV Repairs | 3,444 |
| ☐7623 | Refrigerator Service & Repairs | 1,286 |
| ☐7629 | Electrical Repair Shops | 3,792 |
| ☐7631 | Watches, Clocks & Jewelry Repairs | 937 |
| ☐7641 | Reupholstery & Furniture Repairs | 1,747 |
| ☐7692 | Welding Repairs | 2,676 |
| ☐7694 | Armature Rewinding Shops | 631 |
| ☐7699 | Repair Services nec | 10,792 |
| ☐ 78 | **MOTION PICTURES** | 4,275 |
| ☐7813 | Motion Picture Production Ex TV | 827 |
| ☐7814 | Motion Picture Production For TV | 830 |
| ☐7819 | Svcs Allied to Movies | 387 |
| ☐7820 | Motion Picture Film Exchanges | 148 |
| ☐7824 | Film & Tape Dist For TV | 103 |
| ☐7829 | Motion Picture Dist Services | 47 |
| ☐7832 | Motion Picture Theaters | 425 |
| ☐7833 | Drive-In Movies | 118 |
| ☐7841 | Pre-Recorded Video Cassettes | 1,880 |
| ☐ 79 | **AMUSEMENT AND RECREATION SERVICES NEC** | 9,202 |
| ☐7911 | Dance Halls & Studios | 391 |
| ☐7922 | Theatrical Producers | 852 |
| ☐7929 | Entertainers | 386 |
| ☐7932 | Billiard & Pool Establishments | 588 |
| ☐7933 | Bowling Alleys | 780 |
| ☐7941 | Sports Promotion, Am Pl | 191 |
| ☐7948 | Race Tracks & Stables | 198 |
| ☐7992 | Public Gold Courses | 407 |
| ☐7993 | Coin-Operated Devices | 794 |
| ☐7996 | Amusement Parks | 103 |
| ☐7997 | Membership Sports & Rec | 1,877 |
| ☐7999 | Amusement & Recreation | 2,366 |
| ☐ 80 | **HEALTH SERVICES** | 5,616 |
| ☐8011 | Offices of Physicians | 1,041 |
| ☐8021 | Offices of Dentists | 585 |
| ☐8031 | Offices of Osteopathics | 7 |
| ☐8041 | Offices of Chiropractors | 174 |
| ☐8042 | Offices of Optometrists | 475 |
| ☐8049 | Health Practitioners | 264 |
| ☐8051 | Skilled Nursing Care | 564 |
| ☐8059 | Nursing & Personal Care | 297 |
| ☐8062 | General Medical & Surg Hospitals | 685 |
| ☐8063 | Psychiatric Hospitals | 66 |
| ☐8069 | Specialty Hospitals Ex Psychiatric | 139 |
| ☐8071 | Medical Laboratories | 388 |
| ☐8072 | Dental Laboratories | 538 |
| ☐8081 | Outpatient Care Facilities | 382 |
| ☐8091 | Health & Allied Services | 171 |
| ☐ 81 | **LEGAL SERVICES** | 1,953 |
| ☐8111 | Legal Services | 1,953 |
| ☐ 82 | **EDUCATIONAL SERVICES** | 3,583 |
| ☐8211 | Elementary & Secondary Schools | 861 |
| ☐8221 | Colleges & Universities | 273 |
| ☐8222 | Junior Colleges | 112 |
| ☐8231 | Libraries | 227 |
| ☐8241 | Correspondence Schools | 34 |
| ☐8243 | Data Processing Schools | 44 |
| ☐8244 | Business & Secretarial | 100 |
| ☐8249 | Vocational Schools | 294 |
| ☐8299 | Schools & Educational Services | 1,638 |
| ☐ 83 | **SOCIAL SERVICES** | 3,719 |
| ☐8321 | Individual & Family Services | 681 |
| ☐8331 | Job Training & Related Services | 258 |
| ☐8351 | Child Day Care Services | 611 |
| ☐8361 | Residential Care | 1,184 |
| ☐8399 | Social Services nec | 979 |

CHECK YOUR MARKETS

| SIC | DESCRIPTION | NO. OF ESTAB. |
|---|---|---|
| ☐ 84 | **MUSEUMS, ART GALLERIES, BOTANICAL AND ZOOLOGICAL GARDENS** | 294 |
| ☐8411 | Museums & Art Galleries | 278 |
| ☐8421 | Botanical & Zoo Gardens | 16 |
| ☐ 86 | **NONPROFIT MEMBERSHIP ORGANIZATIONS** | 4,664 |
| ☐8611 | Business Associations | 821 |
| ☐8621 | Professional Organizations | 340 |
| ☐8631 | Labor Organizations | 412 |
| ☐8641 | Civic Associations | 1,051 |
| ☐8651 | Political Organizations | 51 |
| ☐8661 | Religious Organizations | 1,987 |
| ☐8699 | Membership Organizations nec | 812 |
| ☐ 89 | **MISCELLANEOUS SERVICES** | 9,959 |
| ☐8911 | Eng & Arch Services | 5,517 |
| ☐8922 | Non Commercial Research Organizns | 284 |
| ☐8931 | Accounting, Auditing & Bookkeeping | 2,780 |
| ☐8999 | Services, nec | 1,378 |

| | | |
|---|---|---|
| ☐9111 thru 9411 | PUBLIC ADMINISTRATION | 3,086 |

☐ 91 FEDERAL GOVERNMENT ..... 505

☐ 92 PROVINCIAL GOVERNMENT ..... 616

☐ 93 MUNICIPAL GOVERNMENT ..... 1,885

☐ 94 INTL. GOVT. SVCS. ..... 73

GRAND TOTALS ..... 873,857

☐ SPECIAL INSTRUCTIONS

4

The Subscriber has requested that this Agreement be drawn up in the English Language

07-3-344 (8904)

# APPENDIX C

## UCD WASTE CLASSIFICATION SYSTEM
## CONSOLIDATED UCD CLASSIFICATION

TABLE C-1

UCD WASTE CLASSIFICATION SYSTEM

UCD Classification Codes Relevant to Hazardous Waste

| UCD CODE | DESCRIPTION | TYPICAL WASTES |
|---|---|---|
| **11 Acidic Solutions** | | |
| 111 | Acidic Solution with Heavy Metals | Pickle Liquor Rinse Water |
| 112 | Acidic Solution with Other Metals and Non-Metals | Demineralizer Regenerent |
| 113 | Other Acidic Solution | Boiler Stack Scrubber water with Dilute Carbonic Acid |
| **12 Alkaline Solutions** | | |
| 121 | Alkaline Solution with Heavy Metals | Rinse Waters from Surface Cleaning of Metals |
| 122 | Alkaline Solution with Other Metals | Demineralizer Regenerent |
| 123 | Other Alkaline Solutions | Cleanup Water from Lime of Cement Kiln |
| **13 Metal Finishing Solutions** | | |
| 131 | Metal Finishing Solutions, Acid | Ammonia Based, Containing Copper, Tin, Lead or Cadmium |
| 132 | Metal Finishing Solutions, Alkaline | Contains Strong Complexing Agent and Copper, Tin, Lead and/or Cadmium |
| 133 | Spent Pickle Liquor from Ferrous and Non Ferrous Metals | Strong Acids with Iron, Fluoride, Hydrochloric Acid, Sulfuric Acid, Nitric Acid |
| **14 Other Aqueous Solutions** | | |
| 141 | Aqueous Solutions with Heavy Metals | Cleaning Solutions from Tanks, Trucks, or Railroad Tankers |
| 142 | Aqueous Solution with Other Metals | Rinse Water from Heat Treating Salt Baths, Contain Barium, Aluminum |
| 143 | Aqueous Solutions with Reactive Anions | Bleaching Solutions Containing Sulfite, Chlorite, Fluoride, Bromate |

TABLE C-1 (Cont'd)

UCD WASTE CLASSIFICATION SYSTEM

UCD Classification Codes Relevant to Hazardous Waste

| UCD CODE | DESCRIPTION | TYPICAL WASTES |
|---|---|---|
| 145 | Brine | Salt Solutions After Neutralization or Chlor/Alkali Production |
| 146 | Solutions Containing Cyanide | Plating Baths |
| 147 | Solution Containing Sulfides | Plating Baths |
| 15 Inorganic Solids | | |
| 151 | Inorganic Solids | Foundry Sand with Phenolics |
| 152 | Inorganic Solid Chemicals | Aged of Off Spec. Chemicals Including Lime, Caustic Soda and Partial Containers of Laboratory Size |
| 16 Other Inorganic Wastes | | |
| 165 | Spent Catalyst | Maybe Carbon or Metal |
| 167 | Other Inorganic Waste | Ash and Construction Residue |
| 21 Spent Solvents | | |
| 211 | Halogenated Solvents with Heavy Metals | Methylene Chloride 1,1,1-Trichloroethylene used for Metal Cleaning |
| 212 | Halogenated Solvents with Other Metals | Surface Cleaning and Degreasing Solvents |
| 213 | Other Halogenated Solvents | Freon with Other Solvents Used in Chemical Processing |
| 214 | Non-Halogenated Solvents with Heavy Metals | Roluene, Benzene, Xylene Contaminated with Catalysts |
| 215 | Non-Halogenated Solvents with Other Metals | Acetone, Methylisobutylketone (MIBK) used in Paint and Varnish Formulation |
| 216 | Other Non-Halogenated Solvents | Methylethylketone and Other Solvents Contaminated with Dirt |
| 217 | Unspecified Solvents | Alcohols and Mixtures of Solvents |

TABLE C-1 (Cont'd)

UCD WASTE CLASSIFICATION SYSTEM

UCD Classification Codes Relevant to Hazardous Waste

| UCD CODE | DESCRIPTION | TYPICAL WASTES |
|---|---|---|
| 22 Other Organic Liquids | | |
| 221 | Organic Liquids with Metals and Halogens | Dyes |
| 222 | Organic Liquids with Halogens Only | Chloroform, Carbon Tetrachloride |
| 223 | Organic Liquids with Metals Only | Nickelcarbonyl, Methyl Mercury |
| 224 | Other Organic Liquids | Creosote and Other Poly Aromatic Hydrocarbons |
| 225 | Aqueous Solution with Non-Halogenated Residues Less than 10% | Laboratory Mixtures |
| 226 | Aqueous Solution with Halogenated Residues Less than 10% | Waste or Rinse Waters After Degreasing |
| 227 | Aqueous Solution with Non-Halogenated Organic Residue Greater than 10% | Laboratory Mixtures |
| 228 | Aqueous Solution with Halogenated Organic Residue Greater than 10% | Wash or Rinse Waters After Degreasing |
| 24 - 25 Other Organic Wastes | | |
| 241 | Pesticides and Wastes | Partial Containers, Tank Washings, Off Spec. Product, etc. |
| 242 | PCB Oils and High Strength (over 500 ppm) Liquids | From Transformers and Capacitors |
| 243 | Pharmaceuticals and Wastes | Off-Spec. Drugs, Cleanup Waters, etc. Includes Items such as Vitamins |
| 244 | Photochemical Waste | Most Solutions Non-Toxic Except those with Silver |
| 245 | Off-Spec or Aged Organics | Can Include Solids or Liquids. Generally in Containers. |
| 247 | Halogenated Still Bottoms | Spent Solvent or Waste Oil Recovery |
| 248 | Non-Halogenated Still Bottoms | Solvent Recovery Operations |
| 251 | Tannery Wastes - Liquid | Solutions with Hexavalent Chromium |

TABLE C-1 (Cont'd)

UCD WASTE CLASSIFICATION SYSTEM

UCD Classification Codes Relevant to Hazardous Waste

| UCD CODE | DESCRIPTION | TYPICAL WASTES |
|---|---|---|
| 252 | Solid or Sludge Tannery Wastes | Leather Shavings with Chrome |
| 254 | Adhesives or Glue | Waste Glues Mostly Aqueous. Some with Phenols |
| 257 | Phenolic Wastes | Phenolic Oil. Toluene Diisocyanide Residue |
| 258 | Waste Tar and Residues | |
| 26 Polymeric Material Wastes | | |
| 261 | Polymeric Resin | Polyester, Urethane, Etc. |
| 262 | Latex Wastes | Cleanup Water, Paint, Latex and Acrylic Resins |
| 263 | Other Polymeric Wastes | Kettle Bottoms, Thermoplastic Resins |
| 264 | Thermoset Wastes | Urea-Formaldehyde and Thermoset Wastes |
| 28 Oily Wastes | | |
| 281 | Waste Oil and Mixed Oil | Used Automotive Oil, Hydraulic Oil, Cutting Oil - May Contain Solvents or Metals |
| 282 | Oily Tank Bottoms | Crude Oil or Sludge from Storage |
| 283 | Oily Mud, Sediment and Water | Crude Oil Tanker Cleaning |
| 284 | Oily Acidic Solids | Solids from Emulsion Breaking and Re-Refining |
| 285 | Oily Alkaline Solids | Refining Solids |
| 286 | Oil/Water Separator Sludge | Oil Cooled Heavy Inorganics |
| 288 | Oily Wastes with Heavy Metal Contaminants | Steel Rolling Mill Sludges and Mill Scale |
| 289 | Oily Wastes with Water | Emulsions, Cleanup Water from Garages, Cooling Waters |

TABLE C-1 (Cont'd)

UCD WASTE CLASSIFICATION SYSTEM

UCD Classification Codes Relevant to Hazardous Waste

| UCD CODE | DESCRIPTION | TYPICAL WASTES |
|---|---|---|
| 41 Relatively Inert Sludges | | |
| 416 | Ink Sludge | Sludge Could Contain Solvents, and Lead, Cesium, Chromium |
| 417 | Alum and Gypsum Sludges | Waste Water Phosphate, Removal Sludge |
| 43 Metal Sludges | | |
| 431 | Heavy Metal Sludge | Similar to that in 111, 113, 121, 123, 132, 133, 141 |
| 433 | Other Metal Sludges | Ferric Chloride, Aluminum Oxide, etc. |
| 44 - 45 Other Sludges | | |
| 441 | Lime Sludges | From Treatment of Acids and Similar to 431 and Derived from 111, 113, 121, 123, 131, 132, 133, 141 |
| 443 | Sulfur Sludge | Desulfurization of Flue Gas. Non-reactive but Very Low Bearing Strength |
| 444 | Cyanide Bearing Sludge | Pot Liners from Aluminum Reduction and Scrubber Sludge from Blast Furnace |
| 445 | Plating or Metal Finishing Sludge | Derived Mostly from 131, 132, 133 |
| 446 | Degreasing Sludge | Grease and Oily Soil Containing Trichloroethane (TCE) |
| 447 | Tetraethyl Lead Sludge | Tank Bottoms |
| 454 | Paint Sludge | Drum Bottoms, Spills, Cleanup, etc. |
| 455 | Paint Sludge Without Heavy Metals | Mostly Latex |

TABLE C-1 (Cont'd)

UCD WASTE CLASSIFICATION SYSTEM

UCD Classification Codes Relevant to Hazardous Waste

| UCD CODE | DESCRIPTION | TYPICAL WASTES |
|---|---|---|
| 50 - 53 Miscellaneous | | |
| 509 | Gas Cylinders or Containers | Oxygen Cylinders - Empty |
| 512 | Spill Cleanup | Oil/Soil Mixture |
| 513 | Laboratory Waste Chemicals | Partially Full Small Containers |
| 518 | Dust Collector Wastes | Dry Lime from Dust Control Baghouse |
| 521 | Spent Cartridge Filters | Air Cleaning Filters on Ventilation System |
| 523 | Tank Bottom Sediments | |
| 528 | Pathogenic Wastes | Used Bandages, Dressings |
| 531 | Contaminated Rags | Cleanup Materials |
| 532 | Equipment and/or Containers Contaminated with Pesticides | Empty Pesticide Cans |
| Other UCD Classification Codes | | |
| 144 | Other aqueous solution | Aqueous solutions (14) other than 141, 142, 143, 145, 146, or 147 |
| 161 | Asbestos-containing wastes | |
| 162 | Aluminum or tin wastes | |
| 231 | Organic solids with halogens | Polyvinyl |
| 232 | Organic solids without halogens | Polyethylene |
| 253 | Detergent and soap | Liquid, aqueous waste solutions and organic solids from production or cleaning operations |
| 255 | Unspecified organic wastes | Organics not listed in other categories |
| 271 | Sewage sludge | |
| 272 | Other Biological Wastes | Including animal fat, molasses wastes and dough |
| 412 | Filter Cake | Contaminated filter material, eg. diatomaceous earth |

TABLE C-1 (Cont'd)

UCD WASTE CLASSIFICATION SYSTEM

UCD Classification Codes Relevant to Hazardous Waste

| UCD CODE | DESCRIPTION | TYPICAL WASTES |
|---|---|---|
| 413 | Gas scrubber sludge | From gas cleaning operations |
| 442 | Phosphate sludge | |
| 453 | Paper sludge/pulp | Paper and cardboard manufacture source |
| 456 | Other waste treatment sludge | Sludges not otherwise identified due to lack of composition data |
| 457 | Sludges with organic residues | Includes some halogenated components |
| 510 | Flue-gas scrubber liuqid | |
| 511 | Rinse water and waste water | Contains small units of oil, solvent, metals and/or mud; also bilge water |
| 514 | Contaminated oil and sand | |
| 515 | Drilling mud | |
| 519 | Fly ash and retort ash | Combustion-generated particulates mineral matter plus some carbon |
| 524 | Chemical toilet wastes | |
| 525 | Metal dust and machining wastes | Primarily ferrous and aluminum-based alloys |
| 526 | Cannery wastes | |
| 527 | Mud-sediment and water | |
| 530 | Contaminated pallets | |
| 533 | Contaminated equipment and containers | Contaminants not stated |
| 535 | Totally unspecified wastes | Used only for California manifest purposes |

SOURCE: Forrestal et.al. (1986)

TABLE C-2

CONSOLIDATED UCD CLASSIFICATION

| DESCRIPTION OF WASTE STREAM | PHYSICAL CHARACTERISTICS | CHEMICAL CHARACTERISTICS | UCD CODES |
|---|---|---|---|
| ORGANIC SLUDGES AND STILL BOTTOMS (NO OIL)<br>Organic sludges containing metals<br>Halogenated still bottoms<br>Non-Halogenated still bottoms | Viscous or Thixotropic when dewatered | Generally burnable except ash may contain metals, Heating value is net positive, but may require drying or special air pollution control for combustion | 247, 248,252, 261, 263, 446, 523, 529, 257 |
| SOLVENTS & ORGANIC SOLUTIONS<br>Halogenated<br>Non-Halogenated<br>Mixed | Liquid with some solid contaminants | Reasonably flammable. High heating value. Halogenated vapours may be corrosive. | 211, 212, 213, 214, 215, 216, 217, 221, 222, 223, 224 |
| OILS AND GREASES<br>Waste Lube Oil<br>Other Oils and Grease | Dirty lube oils, cutting oils, hydraulic oils. Most contain contaminants. | High heating value. Generally neutral pH | 281 |
| OIL/WATER MIXTURES<br>Emulsified and Free Oil/Water Mixtures | Liquid with separate or dispersed phases. May become viscous at low temperatures. | Generally neutral, low pH may result from emulsion breaking. Usually no positive heating value before separation. | 283 |
| ORGANIC AND OILY RESIDUES<br>Leaded Gasoline<br>Unleaded Gasoline and Organics Food Waste Oil | Thick multi-phase material. Most have inorganics in with organics. May be thick or thixotropic. | Partly combustible. pH may be variable. Could be volatile or odourous. May be explosive in confined containers. | 264, 282, 284, 285, 286, 288, 289, 447 |
| HEAVY METAL SOLUTIONS AND RESIDUALS<br>Spent plating or etching<br>Rinse and less concentrated aqueous solutions<br>Sludges from plating and etching lines<br>Sludges from treatment of solutions containing metals | Acid or alkaline liquids, frequently with solids in solution.<br>Sometimes difficult to pump, physical dewatering required. Reclamation difficult because of stable precipitates. | Extreme pH swings. Complexation is prevalent, special pre-treatment is usually needed.<br>Stable chemical precipi-tates. Highly complexed ammonia, sulfide and/or cyanide species. | 111, 112, 121, 122, 131, 132, 133, 141, 142, 143, 244, 251, 431, 433, 445, 523 |
| MISCELLANEOUS CHEMICALS AND PRODUCTS<br>Organic Chemicals<br>Inorganic Chemicals<br>Salts, Infectious | Properties variable. Some solids and liquids. Containers found in all sizes including small laboratory sizes. | Entire spectrum of products and properties. | 113, 123, 145, 152, 243, 245, 416, 513, 161, 528 |

TABLE C-2 (Cont'd)

CONSOLIDATED UCD CLASSIFICATION

| DESCRIPTION OF WASTE STREAM | PHYSICAL CHARACTERISTICS | CHEMICAL CHARACTERISTICS | UCD CODES |
|---|---|---|---|
| PAINT AND ORGANIC RESIDUALS<br>Latex paint and sludge<br>Solvent based Paint and sludge<br>Wash and Rinse waters<br>Adhesives and Glue | Thick sludge consists of aged paint and heels from drums. Highly viscous. | Mixtures may contain solvents. Also some chromium, zinc, lead found in pigments. | 254, 258, 262, 454, 455 |
| AQUEOUS SOLUTIONS WITH ORGANICS (90% Water)<br>Alcohols and Organic Acids<br>Halogenated Solvents<br>Non-Halogenated Solvents | May have volatile components. Sometimes particulate contaminants are present. | Largely neutral wastes with residual organics. May be azeotropic in nature | 225, 226, 227, 228 |
| ANION COMPLEXES<br>Cyanide<br>Sulfide<br>Other Complexes | High TDS material which can be corrosive or erosive. | Found in combination with metals or high salt solutions. pH is neutral to alkaline | 146, 147, 444 |
| SLUDGES AND INORGANIC RESIDUALS<br>Ash<br>Spent Catalyst | Most are solids with small amount or water. Most are not reactive. Some low rate leaching expected for arsenic, cadmium, acid, etc. | Chemically inert except for residual ion concentrations. Leachates may be either acid or alkaline. | 151, 164, 167, 417, 441, 443, 518, 509 |
| PESTICIDE AND HERBICIDE WASTES<br>High Concentration Organics<br>High Concentration with metals<br>Cleanup waster and diulute solutions | Liquids or solids. Solids are likely to be present with inorganic Carrier | Reactive compounds. Some halogens present. Some reactive non-metals. | 241, 532 |
| PCB WASTES<br>High concentration Liquids (>500 ppm)<br>Medium concentration Liquids (500 ppm)<br>Contaminated Soil (<50 ppm) | High strength wastes are mostly liquids. Medium strength may be flushing liquids or soil or metals in contact with high strength | Unreactive except for high chloride content. Volatility is low but lighter aroclor's are volatile. | 242 |
| CLEAN-UP RESIDUALS<br>Solvent and Organic Waste Inorganic and Metals Pesticides and Herbicides | Cleanup materials are largely soil contaminated or wastes absorbed onto some solid matrix | Chemical composition depends upon nature of spill | 512, 521, 528, 531, 532 |

SOURCE: Proctor and Redfern et.al. (1982)

# APPENDIX D

# HAZARDOUS WASTE GENERATION QUESTIONNAIRE

YUKON TERRITORY
HAZARDOUS WASTE GENERATION QUESTIONNAIRE

Company Name: _____

Address: _____

Phone: _____

Service Type: _____

1. Introductory Remarks

- o your firm has been identified as a potential waste generator
- o need your support to develop a Yukon hazardous waste management strategy
- o require information on hazardous waste amounts, types, sources generated by your firm
- o all information is confidential
- o purpose of this study is to estimate hazardous waste quantity generated in the Yukon

A. <u>CHARACTERISTICS OF WASTE</u>

1. Please describe your hazardous waste stream in your own words.

_____

_____

2. Do you have any of these waste types (specific to industry)?

_____

_____

3. What physical form is it in?

____ gas

____ liquid

____ sludge

____ solid

____ oil based

____ water based

4. Does it contain ANY of the following?

____ halogenated organic compounds _____

____ other organic compounds _____

____ heavy metals _____

____ cyanide _____

____ none of the above _____

5. Does it fall into any of these categories?

____ acid solution pH _____

____ alkaline solution pH _____

____ metal finishing solution _____

____ other aqueous salt solution _____

____ inorganic solids _____

____ fertilizer _____

____ contaminated soil _____

____ spent solvent _____

____ waste oil or grease _____

____ oil/water mixture _____

____ pigment, paint or ink residues _____

____ plastics or resins _____

____ pathological or biological waste _____

____ pharmaceutical or herbicide _____

____ pesticide or herbicide _____

____ PCB _____

____ organic solids

2. Concentrations? _____

_____

_____

_____

B. RATES

1. What rates are they being generated at? _____

_____

C. INVENTORY

1. What quantities are on site at any one time? _____

Type of container? _____

Capacity of container? _____

2. What do you do with them? _____

3. What other waste types do you generate? _____

_____

D. STORAGE

1. Do you have a hazardous waste storage facility? _____

2. Where is it located? _____

3. What type of facility is it? _____

E. DISPOSAL

1. Do you dispose of this on-site or off-site?

If on-site, do you?

____ recycle, re-use, recover _____

____ incinerate or burn as fuel _____

____ discharge to municipal sewer _____

____ discharge to septic tank _____

____ surface discharge to water course _____

____ discharge to water course _____

____ discharge in landfill _____

____ evaporation _____

If on site treatment, describe this method. _____

_____

_____

If off-site

____ remove it yourself

____ removed by commercial disposal service

____ other _____

_____

F. MARKET SHARE

1. How many employees? _____

2. Who are your competitors? (relative size) _____

_____

_____

If you have any questions, please contact:

Wit Siemienuk
Project Manager
Monenco Consultants Limited
400 Monenco Place
801 - 6th Avenue S.W.
Calgary, Alberta
Telephone: (403) 298-4591

Art Dell, P.Eng.
Project Engineer
Yukon Community and Transportation Services
Municipal Engineering Branch
P.O. Box 2703
Whitehorse, Yukon
Telephone: (403) 667-5707

# APPENDIX E

# HAZARDOUS WASTE CLASSIFICATION SYSTEM

PART 2

## HAZARDOUS WASTE CLASSIFICATION GUIDE

Section A is a list of wastes which are not regulated as hazardous waste. Section B provides a list of products, substances, and organisms which are hazardous waste when discarded as waste. Mixtures of these products, substances or organisms with or without inert materials are also hazardous wastes if they exhibit properties described in Section C. Section D is a stepwise procedure for classifying hazardous waste and is intended as an aid in using the list in Section B and the criteria in Section C. Section E summarizes the information required for describing the hazardous waste on the manifest.

To classify a waste it is necessary to know how the waste was produced or what is in the waste. For some wastes it is enough to know that the waste is a product which was purchased, and is being discarded as waste. It is then a matter of knowing what the product is and checking the list in Section B to determine if it is on the list. If it is, it is a hazardous waste. If the waste is produced in an industrial process or operation it may be one of the waste streams listed in Section B. However, many other wastes will have to be tested against the criteria in Section C. Testing should be determined on the basis of what substances are expected to be present in the waste. The methods to be used in testing a waste against the criteria of Section C are given in Part 4.

For example if the waste is a sediment or sludge from a lagoon which held a liquid waste water that contained chromium and zinc, testing should focus on these two metals. The list in Section B includes a number of chromium and zinc compounds. The Class to which they belong appears in the column headed by "Col III". Test the waste against the criteria in Section C for the class shown in "Col III".

SECTION A

The Hazardous Chemicals Act and Hazardous Waste Regulation do not apply to the following wastes, not because of their composition, but because they are already regulated by other legislation or it is impractical to regulate them according to all the requirements of the Hazardous Chemicals Act:

(a) household wastes,

(b) agricultural wastes generated by:

i) the growing and harvesting of agricultural crops, or
ii) the raising of animals, including animal manures returned to the soil as fertilizers,

(c) mining overburden returned to a mine site as approved pursuant to the Land Surface Conservation and Reclamation Act and Regulations thereunder,

(d) fly ash waste, bottom ash waste, slag waste or flue gas emission control waste generated from the combustion of domestic waste, coal, or other fossil fuels as approved pursuant to the Clean Air Act or the Clean Water Act and the regulations under those Acts,

(e) drilling fluids, produced waters, oily waste, fracture fluids, reformates, completion fluids, process and runoff waters, spent iron sponge or similar sweeteners and waste treater hay resulting from the exploration, development or production of crude oil or natural gas approved pursuant to the Oil and Gas Conservation Act, the Oil Sands Conservation Act, the Pipelines Act and regulations under the respective acts,

(f) irrigation return flows approved pursuant to the Water Resources Act and Regulations thereunder,

SECTION A (cont'd)

(g) domestic sewage,

(h) any materials that are for recycle, reuse or reprocessing in facilities approved pursuant to the Clean Water Act or the Clean Air Act and the regulations under those Acts,

(i) point source discharges licensed pursuant to the Clean Water Act or the Clean Air Act and the regulations under those Acts,

(j) agricultural chemicals and their empty containers approved pursuant to the Agricultural Chemicals Act and the regulations under that Act, and

(k) any hazardous waste, except for those containing chemicals listed in Table 2 in Section D of this part, produced by an individual generator in an amount less than 5 kilograms (if a solid) or 5 litres (if a liquid) per calendar month.

Refer to Part 3 for disposal options.

SECTION B

This section contains a list* of products, substances, and organisms which if discarded as waste are to be managed as hazardous waste. It also includes specific wastes which are considered to be hazardous waste and are included in the alphabetical listing as "waste types". In addition, containers described below are hazardous waste:

(a) any container, other than an empty container, that is larger than 5 litres in capacity, and that was used to hold any goods, substances or waste streams referred to in the list, except for those products or substances listed in Table 2 in Section D of this part, and

(b) any unrinsed empty container larger than 5 litres in capacity that was used to hold any product or substance listed in Table 2 in Section D of this part.

It is suggested that the reader refer to Section D while using this list.

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* The list is adopted from List II of Schedule II in the English version of the transportation of Dangerous Goods Regulations (SOR 85-77) under the Transportation of Dangerous Goods Act (Canada).

## SCHEDULE II

## LIST II

## DANGEROUS GOODS OTHER THAN EXPLOSIVES

| Item | Col I<br>Description and Shipping Name | Col II<br>Product Identification Number | Col III<br>Classification | Col. IV<br>Special Provisions | Col. V<br>IMO Classification | Col. VI<br>ICAO Classification | Col. VII<br>Packing Group | Col. VIII<br>Maximum Net Quantity Per Package or Prohibition<br>Passenger Aircraft & Passenger Vehicles | Col. IX<br>Cargo Aircraft |
|---|---|---|---|---|---|---|---|---|---|
| 1 (405) | Accumulators, electric, *see* Batteries | | | | | | | | |
| 2 (83) | Accumulators, pressurized, *pneumatic or hydraulic* with non-flammable gas | 1956 | 2.2 | 37<br>55 | - | 2 | - | NL | NL |
| 3 (91) | Acetal | 1088 | 3.1 | 99 | 3.1 | 3 | II | 5 L | 60 L |
| 4 (100) | Acetaldehyde | 1089 | 3.1<br>9.2 | 46<br>56<br>90<br>99 | 3.1 | 3 | I | P | 30 L |
| 5 (1261) | Acetaldehyde ammonia | 1841 | 9.2 | 44 | 9 | 9 | III | 200 kg | 200 kg |
| 6 (111) | Acetaldehyde oxime | 2332 | 3.3 | 73<br>81 | 3.3 | 3 | II | 5 L | 60 L |
| 7 (501) | Acetic acid, glacial or Acetic acid solution, *more than 80 per cent acid, by mass* | 2789 | 8<br>3<br>9.2 | | 8<br>3 | 8 | II | 1 L | 30 L |
| 8 (48) | Acetic acid solution, *more than 10 per cent but not more than 80 per cent acid, by mass* | 2790 | 8<br>9.2 | | 8 | 8 | II | 1 L | 10 L |
| 9 (49) | Acetic acid solution, *more than 25 per cent but not more than 50 per cent acid, by mass* | 2790 | | | 8 | - | III | - | - |
| 10 (1051) | Acetic anhydride | 1715 | 8<br>9.2 | | 8<br>3 | 8 | II | 1 L | 30 L |
| 11 (139) | Acetone | 1090 | 3.1 | 99 | 3.1 | 3 | II | 5 L | 60 L |
| 12 (8511) | Acetone cyanohydrin | 1541 | 6.1<br>9.2 | 46<br>56<br>90<br>98<br>99<br>102 | 6.1 | 6.1 | I | P | 30 L |
| 13 (1597) | Acetone oils | 1091 | 3.2 | | 3.2 | 3 | II | 5 L | 60 L |
| 14 (40) | Acetonitrile, *see* Methyl cyanide | | | | | | | | |
| 15 (12740) | Acetyl acetone peroxide *or* 3,5-Dimethyl-3,5-dihydroperoxydioxolane-1,2, *not more than 40 per cent in solution, and not more than 9 per cent active oxygen, by mass* | 2080 | 5.2 | 46<br>48<br>56<br>81<br>90 | 5.2 | 5.2 | II | 5 L | 10 L |

## LIST II—Con.

## DANGEROUS GOODS OTHER THAN EXPLOSIVES—Con.

| | Col. I | Col. II | Col. III | Col. IV | Col. V | Col. VI | Col. VII | Col. VIII | Col. IX |
|---|---|---|---|---|---|---|---|---|---|
| 16. (2243) | Acetyl benzoyl peroxide, solid | | - | 47 | - | - | - | - | - |
| 17. (2242) | Acetyl benzoyl peroxide, *not more than 45 per cent in solution* | 2081 | 5.2 | 46<br>48<br>56<br>83<br>99 | 5.2 | 5.2 | II | 5 L | 10 L |
| 18. (489) | Acetyl bromide | 1716 | 8 | | 8 | 8 | II | 1 L | 30 L |
| 19. (717) | Acetyl chloride | 1717 | 9.2<br>3.2<br>8<br>9.2 | | 3.2<br>8 | 3<br>8 | II | 1 L | 5 L |
| 20. (2245) | Acetyl cyclohexanesulphonyl peroxide, *not more than 32 per cent in solution* | 2083 | 5.2 | 46<br>48<br>56<br>83<br>99<br>-10°C<br>0°C | 5.2 | 5.2 | II | P | P |
| 21. (2244) | Acetyl cyclohexanesulphonyl peroxide, *not more than 82 per cent, uniformly wetted with not less than 12 per cent water* | 2082 | 5.2<br>E | 46<br>48<br>56<br>83<br>99<br>-10°C<br>0°C | 5.2<br>E | 5.2<br>E | I | P | P |
| 22. (41) | Acetylene, dissolved *or* Acetylene | 1001 | 2.1 | 46<br>48<br>56<br>102 | 2.1 | 3<br>3 | X | P | 15 kg |
| 23. (42) | Acetylene, liquified | | - | 47 | - | - | - | - | - |
| 24. (1003) | Acetylene silver nitrate | | - | 47 | - | - | - | - | - |
| 25. (2901) | Acetylene tetrabromide, *see* Tetrabromoethane | | | | | | | | |
| 26. (1682) | Acetyl iodide | 1898 | 8 | | 8 | 8 | II | 1 L | 30 L |
| 27. (43) | Acetyl methyl carbinol | 2621 | NR | 73 | 3.3 | 3 | III | 60 L | 220 L |
| 28. (2241) | Acetyl peroxide, *see* Diacetyl peroxide | | | | | | | | |
| 29. (2574) | Acid butyl phosphate, *see* Butyl acid phosphate | | | | | | | | |
| 30. (136) | Acid, sludge, *see* Sludge acid | | | | | | | | |
| 31. (163) | Acridine | 2713 | 6.1 | | 6.1 | 6.1 | III | 25 kg | 100 kg |
| 32. (165) | Acrolein, inhibited | 1092 | 3.1<br>6.1<br>9.2 | 46<br>56<br>84<br>99 | 3.1<br>6.1 | 3<br>6.1 | I | P | 30 L |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 33<br>(IA4) | Acrolein dimer, stabilized | 2607 | 3.3 | 73<br>81<br>84 | 3.3 | 3 | II | 5 L | 60 L |
| 34<br>(IA6) | Acrylamide | 2074 | NR | 73 | 6.1 | 6.1 | III | 100 kg | 200 kg |
| 35<br>(IA1) | Acrylic acid, inhibited | 2218 | 8 | 84 | 8<br>3 | 8<br>3 | II | 1 L | 30 L |
| 36<br>(IA5) | Acrylonitrile, inhibited | 1093 | 3.2<br>6.1<br>9.2 | 46<br>51<br>56<br>84<br>99<br>102 | 3.2<br>6.1 | 3<br>6.1 | I | P | 30 L |
| 37<br>(RI1) | ADHESIVES *containing a liquid having a flash point less than -18°C* | 1133 | 3.1 | 99 | 3.1 | 3 | II | 5 L | 60 L |
| 38<br>(RI2) | ADHESIVES *containing a liquid having a flash point not less than -18°C but less than 23°C* | 1133 | 3.2 | | 3.2 | 3 | II | 5 L | 60 L |
| 39<br>(RI3) | ADHESIVES *containing a liquid having a flash point not less than 23°C but less than 61°C* | 1133 | - | 73 | 3.3 | 3 | II | 5 L | 60 L |
| 40<br>(RI4) | ADHESIVES *containing a liquid having a flash point not less than 23°C but less than 37.8°C* | 1133 | 3.3 | | - | 3 | III | 60 L | 220 L |
| 41<br>(RI5) | ADHESIVES *containing a liquid having a flash point not less than 37.8°C but less than 61°C* | 1133 | NR | 73 | - | 3 | III | 60 L | 220 L |
| 42<br>(I52) | Adipic acid | 9077 | 9.2 | 49 | - | - | III | - | - |
| 43<br>(I71) | Adiponitrile | 2205 | NR | 73 | 6.1 | 6.1 | III | 60 L | 220 L |
| 44<br>(IA8) | Aerosol dispensers or Aerosol product, *see* Aerosols | | | | | | | | |
| 45<br>(I73) | AEROSOLS, *containing any quantity of a poisonous gas* | 1950 | 2.3 | 47<br>92<br>100 | - | - | X | - | - |
| 46<br>(I72) | AEROSOLS, *containing compressed oxygen* | 1950 | 2.2<br>5.1 | 96<br>100 | - | - | X | - | - |
| 47<br>(IA0) | AEROSOLS, *containing more than 10 per cent by mass of total contents as a flammable gas* | 1950 | 2.1 | 45<br>56<br>96 | 2.1 | - | X | - | - |
| 48<br>(IA3) | AEROSOLS, *containing more than 10 per cent by mass of total contents as a flammable gas, and more than 5 per cent corrosive material* | 1950 | 2.1<br>8 | 46<br>56<br>92<br>96<br>100 | - | - | X | - | - |
| 49<br>(IA2) | AEROSOLS, *containing more than 10 per cent by mass of total contents as a flammable gas, and more than 35 per cent flammable liquid* | 1950 | 2.1 | 45<br>56<br>96<br>100 | - | - | X | - | - |
| 50<br>(IA1) | AEROSOLS, *containing more than 10 per cent by mass of total contents as a flammable gas, and more than 10 per cent poisonous material* | 1950 | 2.1<br>6.1 | 46<br>56<br>92<br>96<br>100 | - | - | X | - | - |
| 51<br>(IA4) | AEROSOLS, *containing more than 10 per cent by mass of total contents as a non-flammable, non-poisonous gas* | 1950 | 2.2 | 45<br>96<br>100 | - | - | X | - | - |
| 52<br>(IA6) | AEROSOLS, *containing more than 10 per cent by mass of total contents as a non-flammable, non-poisonous gas, and more than 5 percent corrosive material* | 1950 | 2.2<br>8 | 46<br>56<br>92<br>96<br>100 | - | - | X | - | - |

| | Col. I | Col II | Col III | Col IV | Col V | Col. VI | Col. VII | Col. VIII | Col. IX |
|---|---|---|---|---|---|---|---|---|---|
| 53. (1185) | AEROSOLS, *containing more than 10 per cent by mass of total contents as a non-flammable, non-poisonous gas, and more than 35 per cent flammable liquid* | 1950 | 2.1 | 45<br>56<br>96<br>100 | | | X | - | - |
| 54. (1187) | AEROSOLS, *containing more than 10 per cent by mass of total contents as a non-flammable, non-poisonous gas, and more than 10 per cent poisonous material* | 1950 | 2.3 | 46<br>56<br>92<br>96<br>100 | - | - | X | - | - |
| 55. (1174) | Aerosols, *containing not more than 10 per cent by mass of total contents as a non-poisonous gas* | 1950 | 9.1 | 45<br>96<br>100 | - | - | X | - | - |
| 56 (1173) | AEROSOLS, *containing not more than 10 per cent by mass of total contents as a non-poisonous gas, with more than 5 per cent corrosive material* | 1950 | 8 | 45<br>75<br>92<br>96<br>100 | - | - | X | - | - |
| 57 (1176) | AEROSOLS, *containing not more than 10 per cent by mass of total contents as a non-poisonous gas, with more than 45 per cent flammable liquid* | 1950 | 3.1 | 45<br>75<br>96<br>100 | - | - | X | - | - |
| 58. (1177) | AEROSOLS, *containing not more than 10 per cent by mass of total contents as a non-poisonous gas, with more than 45 per cent flammable liquid* | 1950 | 3.2 | 45<br>75<br>96<br>100 | - | - | X | - | - |
| 59 (1178) | AEROSOLS, *containing not more than 10 per cent by mass of total contents as a non-poisonous gas, with more than 45 per cent flammable liquid* | 1950 | 3.3 | 45<br>75<br>96<br>100 | - | - | X | - | - |
| 60 (1179) | AEROSOLS, *containing not more than 10 per cent by mass of total contents as a non-poisonous gas, with more than 10 per cent poisonous material* | 1950 | 6.1 | 45<br>75<br>92<br>100 | - | - | X | - | - |
| 61 (1990) | Air, compressed | 1002 | 2.2 | | 2.2 | 2 | X | 75 kg | 150 kg |
| 62 (1991) | Air, refrigerated liquid, *non-pressurized* | 1003 | 2.2<br>5.1 | 46<br>100 | 2.2<br>5.1 | 2<br>5.1 | X | P | P |
| 63 (1992) | Air, refrigerated liquid, *pressurized or low pressure, less than 175 kPa* | 1003 | 2.2<br>5.1 | 46<br>90<br>100 | 2.2<br>5.1 | 2<br>5.1 | X | P | 150 kg |
| 64 (2990) | Aircraft evacuation slides, *see* Life-rafts, *inflatable* | | | | | | | | |
| 65 (2733) | Aircraft hydraulic power unit fuel tank *(with a mixture of anhydrous hydrazine and monomethyl hydrazine) (MH6 fuel)* | 9001 | 3.1<br>6.1<br>8 | 46<br>90 | | 3<br>6.1<br>8 | I | P | 42 L |
| 66 (1301) | Aircraft survival kits, *see* Life-rafts, *inflatable* | | | | | | | | |
| 67 (1246) | Aircraft thrust device *for assisted take-off* | 2791 | 4.1 | 46<br>90<br>99 | 4.1 | 4.1 | II | P | 250 kg |

SECTION C

This section presents the criteria* which dictate whether mixtures of products, substances and organisms listed in Section B, and inert substances are hazardous waste.

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* The criteria are adopted from part III in the English version of the transportation of Dangerous Goods Regulations (SOR 85-77) under the Transportation of Dangerous Goods Act (Canada).

## Part III – Classification

3.1 (1) For the purposes of this Part, "consignor", in respect of dangerous goods, means any person

(a) who manufactures the dangerous goods or formulates products containing the dangerous goods, including the preparation or alteration of mixtures and solutions containing the dangerous goods; or

(b) on whose behalf an international consignment or a transborder consignment of the dangerous goods is brought into Canada. (SOR/85-609, s. 26)

(2) Where the classification of dangerous goods is not in accordance with this Part and a person who handles, offers for transport or transports the dangerous goods notices the error in classification, that person shall classify the dangerous goods, or cause them to be classified, in accordance with this Part. (SOR/85-609, s. 26)

3.2 (1) The dangerous goods set out in column I of List II of Schedule II that are to be transported in an international consignment other than by air have the corresponding IMO classification set out in column V and are included in the packing group set out in column VII of that List. (SOR/85-609, s. 27)

(2) The dangerous goods set out in Column I of List II of Schedule II that are to be transported in an international consignment order than by ship have the corresponding ICAO classification set out in Column VI and are included in the packing group set out in Column VII of that List.

(3) Where, in these Regulations, the words "class", "division", "classification", "primary classification" or "subsidiary classification" are associated with a number or a set of numbers, the number preceding the point refers to the class and the number following the point refers to the division.

### Classification of Specified Dangerous Goods

3.3 (1) The specified dangerous goods set out in Column I of List I of Schedule II have the corresponding classification set out in Column III of that List and are included in Packing Group II.

(2) The specified dangerous goods set out in Column I of List II of Schedule II have the corresponding classification set out in Column III and are included in the packing group set out in Column VII of that List.

3.4 (1) The primary classification of specified dangerous goods set out in Column I of a List, is the class and division, if any, indicated by the first set of numbers in Column III of List I of Schedule II or Columns III, V or VI of List II of Schedule II.

(2) The subsidiary classification of specified dangerous goods set out in Column I of a List, is each class and division, if any, indicated below the primary classification in Column III of List I of Schedule II or Columns III, V or VI of List II of Schedule II.

3.5 (1) The compatibility group of dangerous goods set out in Column I of List I, is the letter indicated beside the primary classification of the dangerous goods in Column III of List I of Schedule II.

(2) The product identification number of dangerous goods set out in Column I of a List is the number indicated for the dangerous goods in Column II of List I of Schedule II or List II of Schedule II.

### Classification of Not Fully Specified Dangerous Goods

3.6 *General* (1) Subject to paragraphs 3.7(b) and (c), where no shipping name that is specified in List II of Schedule II is applicable in respect of dangerous goods, the consignor shall classify the dangerous goods, using the following method:

(a) the class or classes of the dangerous goods shall be the class or classes for which any of the criteria set out in sections 3.10 to 3.23, 3.25, 3.26 and 3.28 accurately describe the dangerous goods;

(b) the division or divisions, if any, of the dangerous goods shall be the division or divisions, if any, of the class or classes ascertained for the dangerous goods pursuant to paragraph (a) for which any of the criteria set out in sections 3.10 to 3.23, 3.25, 3.26 and 3.28 accurately describe the dangerous goods; and

(c) the packing group or groups, if any, of the dangerous goods shall be the packing group or groups, if any, of the class or classes ascertained for the dangerous goods pursuant to paragraph (a) for which any of the criteria set out in sections 3.10 to 3.23, 3.25, 3.26 and 3.28 accurately describe the dangerous goods.

(2) Where the dangerous goods referred to subsection (1) have more than one class, division or packing group, the consignor shall ascertain the primary classification and the packing group in accordance with section 3.8.

(3) The consignor shall use for the dangerous goods referred to in subsection (1) the shipping name set out in Column I of List II of Schedule II that corresponds to the classification and packing group, if any, ascertained pursuant to subsection (1) or (2).

3.7 No person shall classify

(a) a product or substance as a product or substance included in Class 1 unless the product or substance is classified by or under the [illegible]

(b) a not fully specified product or substance as a product or substance included in Class 7 unless the product or substance is classified by or under the *Atomic Energy Control Act*; or

(c) a not fully specified product or substance as a product or substance included in Class 9.

3.8 ***Determination of primary classification, subsidiary classification and packing group.*** (1) Subject to subsections (2) to (6), where the dangerous goods referred to in subsection 3.6(2) have one or more than one classification and packing group that corresponds to one or more classification and packing group set out in Column I of Schedule I and one or more than one classification and packing group that corresponds to one or more than one classification and packing group set out in one of the headings of Column II to XVI of Schedule I,

(a) the packing group of those dangerous goods is the one with the lowest Roman numeral;

(b) the primary classification of those dangerous goods is the classification that, using all combinations, takes precedence in accordance with Schedule I; and

(c) the subsidiary classification of those dangerous goods is the classification, other than the primary classification referred to in paragraph (b) and where the dangerous goods have more than one subsidiary classification, the subsidiary classification that takes precedence over all other subsidiary classifications is the subsidiary classification that, using all combinations, takes precedence in accordance with Schedule I

(2) Where the dangerous goods referred to in subsection 3.6(2) have a classification of Class 7, the primary classification of the dangerous goods is Class 7.

(3) Where the dangerous goods referred to in subsection 3.6(2) have a classification of Class 2, whether or not they have a classification of another class, other than Class 7, the primary classification of the dangerous goods is Class 2.

(4) Where the dangerous goods referred to in subsection (3) meet the criteria of more than one division of Class 2, Division 3 or 4 of Class 2, whichever is applicable, shall take precedence over Division 1 of Class 2.

(5) Subject to subsection (3), where the dangerous goods referred to in section 3.6(2) have a classification of Division 2 of Class 5, the primary classification of the dangerous goods is Division 2 of Class 5.

(6) Subject to subsection (3), where the dangerous goods referred to in subsection 3.6(2) have a classification of Division 2 of Class 6, the primary classification of the dangerous goods is Division 2 of Class 6.

(7) Where the dangerous goods referred to in section 3.12 that are not subject to special provision 63,

(a) do not meet the criteria set out in section 3.13, and

(b) have a subsidiary classification,

the primary classification of the dangerous goods is the subsidiary classification referred to in paragraph (b).

**Criteria of Classes and Packing Groups for Classifying Not Fully Specified Dangerous Goods**

3.9 *Class 1 – Explosives.* Products or substances

(a) that are capable, by self-sustaining chemical reaction, of producing gas at such temperature, pressure and speed as to damage the surroundings, or

(b) that are manufactured for the purpose of producing a practical explosive or pyrotechnic effect,

shall be included in Class 1 referred to in the schedule to the Act.

3.10 *Class 2 – Gases.* Not fully specified products or substances that

(a) have a critical temperature less than 50°C or an absolute vapour pressure greater than 294 kPa at 50°C,

(b) exert an absolute pressure in the cylinder, packaging, tube or tank in which it is contained, greater than 275 ± 1 kPa at 21.1°C or 717 ± 2 kPa at 54.4°C,

(c) are flammable liquids that have an absolute vapour pressure of more than 275 kPa at 37.8°C as determined by ASTM test D323 as referred to in Part III of Schedule VI,

(d) are gases in the refrigerated liquid form that have a boiling point less than −84°C at 101.325 kPa absolute pressure, or

(e) are liquid carbon dioxide,

shall be included in Class 2 referred to in the schedule to the Act.

3.11 *Divisions – Class 2 (Gases).* Gases included in Class 2 pursuant to section 3.10 shall be included in

(a) Division 1, if the gases

(i) are ignitable at normal atmospheric pressure when in a mixture of 13 per cent or less by volume with air, or

(ii) have a flammability range of at least 12;

(b) Division 3, if the gases have an $LC_{50}$ value less than 5 000 mL/m³ at normal atmospheric pressure by reason of toxicity;

(c) Division 4, if the gases have an $LC_{50}$ value less than 5 000 mL/m³ at normal atmospheric pressure by reason of corrosion effects on the tissues of the respiratory tract; or

(d) Division 2, if the gases are not included in Division 1, 3 or 4.

3.12 *Class 3 – Flammable liquids.* (1) Subject to subsection (2), not fully specified products or substances that are liquids, a mixture of

liquids or liquids containing solids in solution or suspension and that have a flash point not greater than 61°C are flammable liquids and shall be included in Class 3 referred to in the schedule to the Act.

(2) For the purposes of subsection (1), the flash point shall be determined by the closed cup test method.

3.13 *Divisions – Class 3 (Flammable liquids).* Flammable liquids included in Class 3 pursuant to section 3.12 shall be included in

(a) Division 1, if they have a flash point less than −18°C;

(b) Division 2, if they have a flash point not less than −18°C but less than 23°C; or

(c) Division 3

(i) if they are subject to special provision 63, or

(ii) if they have a flash point not less than 23°C but less than 37.8°C and they are to be transported in a domestic consignment or a trans-border consignment. (SOR/85-609, s. 28)

3.14 *Packing groups – Class 3 (Flammable liquids).* (1) Subject to subsection (2), flammable liquids included in Class 3 pursuant to section 3.12 and that meet the criteria set out in section 3.13 shall be included in

(a) Packing Group I, if they have an initial boiling point of 35°C or less at an absolute pressure of 101.325 kPa;

(b) Packing Group II, if they have an initial boiling point greater than 35°C at an absolute pressure of 101.325 kPa and a flash point less than 23°C; or

(c) Packing Group III, if

(i) they have an initial boiling point greater than 35°C at an absolute pressure of 101.325 kPa,

(ii) they are to be transported in a domestic consignment or a transborder consignment, and (SOR/85-609, s. 29)

(iii) they have a flash point not less than 23°C but less than 37.8°C.

(2) Flammable liquids included in Class 3 pursuant to section 3.12 that are viscous, other than nitrocellulose-based paint, and that have a flash point less than 23°C shall be included in Packing Group III if,

(a) after the flammable liquids have been tested in accordance with the solvent separation test set out in Part IV of Schedule VI, the upper separated layer of clear solvent represents less than three per cent of the quantity being tested;

(b) after the flammable liquids has been tested in accordance with the viscosity test referred to in Part V of Schedule VI or any equivalent test, the flammable liquids have a kinematic viscosity set out in Column I of an item of the Table to this section, and have the corresponding flash point set out in Column II of that item; and

(c) not more than five per cent of the flammable liquids consist of a substance that

(i) is included in Packing Group I or II of Class 8 or of Division 1 of Class 6, or

(ii) is included in Packing Group I of Class 3 and has subsidiary classification of Class 8 or Division 1 of Class 6.

TABLE

*(s. 3.14)*

| Item | Column I<br>Kinematic Viscosity $mm^2/sec$ | Column II<br>Flashpoint °C |
|---|---|---|
| 1. | greater than 20 but equal to or less than 80 | less than 23 but greater than 17 |
| 2. | greater than 80 but equal to or less than 135 | 17 or less but greater than 10 |
| 3. | greater than 135 but equal to or less than 220 | 10 or less but greater than 5 |
| 4. | greater than 220 but equal to or less than 300 | 5 or less but greater than −1 |
| 5. | greater than 300 but equal to or less than 700 | −1 or less but greater than −5 |
| 6. | greater than 700 | −5 or less |

3.15 *Class 4 – Flammable solids; substances liable to spontaneous combustion; substances that on contact with water emit flammable gases.* Not fully specified products or substances that consist of

(a) solids that under normal conditions of transport are flammable for the reasons that

(i) they are readily ignitable and that would burn vigourously or persistently, or

(ii) they cause fire or contribute to fire through friction or from heat retained from manufacturing or processing,

(b) substances that are liable to spontaneous combustion under normal conditions of transport or are liable to heat in contact with air to the point where they ignite, or

(c) substances that on contact with water emit dangerous quantities of flammable gases or become spontaneously combustible on contact with water or water vapour,

shall be included in Class 4 referred to in the schedule to the Act

3.16 *Divisions – Class 4 (Flammable solids; substances liable to spontaneous combustion; substances that on contact with water emit*

*flammable gases).* Products or substances included in Class 4 pursuant to section 3.15 shall be included in

(a) Division 1, if they are flammable solids;

(b) Division 2, if they are substances liable to spontaneous combustion; or

(c) Division 3, if they are substances that on contact with water emit flammable gases.

3.17 *Class 5 — Oxidizing substances and organic peroxides.* Not fully specified products or substances that

(a) cause or contribute to the combustion of other material by yielding oxygen or other oxidizing substances, whether or not the product or substance is itself combustible, or

(b) are organic compounds that contain the bivalent "-0-0-" structure,

shall be included in Class 5 referred to in the schedule to the Act.

3.18 *Divisions — Class 5 (Oxidizing substances and organic peroxides).* Products or substances included in Class 5 pursuant to section 3.17 shall be included in

(a) Division 1, if they are oxidizing substances; or

(b) Division 2, if they are organic compounds that contain the bivalent "-0-0-" structure.

3.19 *Class 6 — Poisonous (toxic) and infectious substances.* Not fully specified products or substances that

(a) in the case of solids with oral toxicity, have an $LD_{50}$ not greater than 200 mg/kg,

(b) in the case of liquids with oral toxicity, have an $LD_{50}$ not greater than 500 mg/kg,

(c) in the case of substances with dermal toxicity, have an $LD_{50}$ not greater than 1 000 mg/kg,

(d) in the case of dusts or mists with inhalation toxicity, have an $LC_{50}$ not greater than 10 000 mg/m³ at normal atmospheric pressure,

(e) have a saturated vapour concentration greater than 0.2 times the $LC_{50}$ expressed in mL/m³ at normal atmospheric pressure and an inhalation toxicity value not greater than 5 000 mL/m³ at normal atmospheric pressure, or (SOR/85-609, s. 30)

(f) are organisms that are infectious or that are reasonably believed to be infectious to humans or to animals and the toxins of such organisms,

shall be included in Class 6 referred to in the schedule to the Act.

3.20 *Divisions — Class 6 (Poisonous (toxic) and Infectious substances).* Products or substances included in Class 6 pursuant to section 3.19 shall be included in

(a) Division 1, if they are included in Class 6 pursuant to paragraphs 3.19(a) to (e); or

(b) Division 2, if they are included in Class 6 pursuant to paragraph 3.19(f).

3.21 *Packing groups — Class 6 (Poisonous (toxic) and Infectious substances).* (1) Subject to subsections (2) and (3), products or substances included in

(a) Division 1 of Class 6 pursuant to paragraph 3.20(a) shall be included in

(i) the packing group specified in Column I of an item of Table I to section 3.22 if the product or substance has an $LD_{50}$ or an $LC_{50}$ within the range set out in Column II, III, IV or V for that item where the product or substance is in the form and has the toxicity of the type described in the heading of the column, or

(ii) the packing group specified in Column I of an item of Table II to section 3.22 if the product or substance has been assigned to Class 6 pursuant to paragraph 3.19(e) and meets the criteria shown in Column II of that item; or

(b) Division 2 of Class 6 pursuant to paragraph 3.20(b) shall be included in Packing Group I.

(2) Subject to subsection (3), where products or substances included in Class 6 pursuant to paragraphs 3.19(a) to (e) meet the criteria for more than one packing group, they shall be included in the packing group with the lowest Roman numeral.

(3) Notwithstanding any other requirement in these Regulations, all substances intended to be used as tear gas that are included in Packing Group III pursuant to Table II to section 3.22 shall be included in Packing Group II.

3.22 (1) For the purposes of Table I to this section "dust" means a mixture of solid particles and air in which 90 per cent or more of the particulate material has a diameter not greater than 10 micrometres.

(2) For the purposes of Table II to this section, "V" means saturated vapour concentration at normal atmospheric pressure.

TABLE I

*(s. 3.21 and 3.22)*

| Item | Column I<br>Packing Group | Column II<br>$LD_{50}$ for solids with Oral Toxicity (mg/kg) | Column III<br>$LD_{50}$ for liquids with Oral Toxicity (mg/kg) | Column IV<br>$LD_{50}$ for substances with Dermal Toxicity (mg/kg) | Column V<br>$LC_{50}$ for dusts or mists with Inhalation Toxicity ($mg/m^3$)* |
|---|---|---|---|---|---|
| 1. | I | less than or equal to 5 | less than or equal to 5 | less than or equal to 40 | less than or equal to 500 |
| 2. | II | Greater than 5 but less than or equal to 50 | Greater than 5 but less than or equal to 50 | Greater than 40 but less than or equal to 200 | Greater than 500 but less than or equal to 2 000 |
| 3. | III | Greater than 50 but less than or equal to 200 | Greater than 50 but less than or equal to 500 | Greater than 200 but less than or equal to 1 000 | Greater than 2 000 but less than or equal to 10 000 |

* To convert mg/L to $mg/m^3$ multiply by 1 000.

TABLE II

*(s. 3.21 and 3.22)*

| Item | Column I<br>Packing Group | Column II<br>Criteria |
|---|---|---|
| 1. | I | $LC_{50}$ less than or equal to 1 000 $mL/m^3$ and V greater than or equal to 10 times $LC_{50}$. |
| 2. | II | $LC_{50}$ less than or equal to 3 000 $mL/m^3$ and V greater than or equal to $LC_{50}$ and criteria for Packing Group I not met. |
| 3 | III | $LC_{50}$ less than or equal to 5 000 $mL/m^3$ and V greater than or equal to 0.2 times $LC_{50}$ and criteria for Packing Groups I and II are not met. |

3.23 ***Determination of $LD_{50}$ value or $LC_{50}$ value of a poisonous mixture or solution.*** (1) For the purposes of sections 3.19 and 3.21, where the $LD_{50}$ value of a product is unknown

(a) and the product is a mixture or solution containing only one poisonous substance, the $LD_{50}$ value of the product may be calculated using the following formula:

$$\text{LD}_{50}\text{ value of the product} = \frac{\text{LD}_{50}\text{ of poisonous substance} \times 100}{\text{percentage of poisonous substance by mass}}$$

(b) and the product is a mixture or solution containing more than one poisonous substance,

(i) the $LD_{50}$ of each poisonous substance in the product may be calculated according to paragraph (a),

(ii) the total mass of poisonous substances shall be obtained by adding the masses of all poisonous substances in the mixture or solution that have an $LD_{50}$ referred to in paragraphs 3.29(a) to (c), and

(iii) the $LD_{50}$ value of the total mixture may be calculated using the following formula:

$$\text{LD}_{50}\text{ value of total mixture} = \frac{\text{LD}_{50}\text{ of the substance with the smallest calculated LD}_{50}\text{ value} \times 100}{\text{percentage of the total mass of poisonous substances in the mixture}}$$

(SOR/85-609, s. 31(1))

(2) For the purposes of sections 3.11, 3.19 and 3.21, where the $LC_{50}$ value of a product is unknown (SOR/85-609, s. 31(2))

(a) and the product is a mixture or solution containing only one poisonous substance, the $LC_{50}$ value of the product may be calculated using the following formula:

$$\text{LC}_{50}\text{ value of the product} = \frac{\text{LC}_{50}\text{ of poisonous substance} \times 100}{\text{percentage of poisonous substance by mass}}$$

SECTION D

This section provides a stepwise procedure to assist waste generators in determining whether their waste is a hazardous waste listed in Section B (page 6) or described in Section C (page 7).

| | YES | NO |
|---|---|---|
| 1. Is the waste a discarded dangerous goods that is listed in TDGR*, List II, Schedule II (see Section B, page 6) and that has the numeral "37" appearing in column IV of that list?<br><br>If Yes, proceed to 13 (page 10).<br>If No, proceed to 2. | ___ | ___ |
| 2. Is the waste one of the waste types listed in TDGR, List II, Schedule II, item number 2969 to 3066? (See Section B, page 6) Item numbers are located on left side of page above the numbers in parentheses).<br><br>If Yes, proceed to Section E (i) (page 11).<br>If No, proceed to 3. | ___ | ___ |
| 3. Is the waste a discarded dangerous good that is listed in TDGR, List II, Schedule II? (This is limited to those goods not capitalized) (See Section B, page 6).<br><br>If Yes, proceed to Section E (ii) (page 11).<br>If No. proceed to 4. | ___ | ___ |
| 4. Is the waste an off-specification dangerous good which if it met specifications, would be a dangerous good referred to in 3?<br><br>If Yes, proceed to Section E (ii) (page 11).<br><br>If No, proceed to 5. | ___ | ___ |
| 5. Is the waste a mixture of one inert substance and any of the substances listed in TDGR, List II, Schedule II with the numeral 5 before the "." in Column III? (See Section B, page 6).<br><br>If Yes, proceed to Section E (iv) (page 12).<br><br>If No, proceed to 6. | ___ | ___ |

* Transportation of Dangerous Goods Regulation (SOR 85-77)

| | | YES | NO |
|---|---|---|---|
| 6. | Is the waste a mixture of substances of which only <u>one</u> is a substance listed in TDGR, List II, Schedule II (see Section B, page 6) with the numerals 3, 4, 6 or 8 before the "." in Column 3 and the amount of that substance in the waste results in the waste meeting any of the criteria for classes 3, 4, 6** or 8 set out in TDGR Part III? (See Section C, page 7). | ___ | ___ |
| | If Yes, proceed to Section E (iii) (page 11). | | |
| | If No, proceed to 7. | | |
| 7. | Is the waste a mixture of substances of which <u>two or more</u> substances are listed in TDGR, List II, Schedule II (see Section B, page 6) with the numerals 3, 4, 6 or 8 before the "." in Column 3 and the amount of those substances results in the waste meeting any of the criteria for classes 3, 4, 6** or 8 set out in TDGR Part III? (See Section C, page 7). | ___ | ___ |
| | If Yes, proceed to Section E (V) (page 12). | | |
| | If No, proceed to 8. | | |
| 8. | Is the waste a mixture of one or more inert substances and any of the substances listed in TDGR, List II, Schedule II (see Section B, page 6) with the numeral 9 before the "." in Column 3 except for those substances regulated by the Environmental Contaminants Act? | ___ | ___ |
| | If Yes, proceed to Section E (xi) (page 19). | | |
| | If No, proceed to 9. | | |
| 9. | Is the waste a container larger than 5 litres in capacity that held a dangerous good and which is not empty? (An empty container is one that contains less than 2.5 centimeters of residue at the bottom of the container or less than 3% of the original contents, whichever is the lesser amount). | | |
| | If Yes, proceed to Section E (ii) (page 11). | | |
| | If No, proceed to 10. | | |

** In applying Class 6 Criteria to a waste mixture or solution, toxicity of the waste may be calculated in accordance with the procedure described in Part 4, page 27.

| | YES | NO |
|---|---|---|
| 10. Is the waste an empty container larger than 5 litres in capacity, that held a product or substance listed in Table 2 and was not triple rinsed*? | ____ | ____ |

If Yes, proceed to Section E (ii) (page 11).

If No, proceed to 11.

| | | |
|---|---|---|
| 11. Is the waste a mixture of substances which meet the criteria for Class 7, Radioactive, presented in TDGR, Part III? (See Section C, page 7). | ____ | ____ |

If Yes, proceed to Section E (xii) (page 20).

If No, proceed to 12.

| | | |
|---|---|---|
| 12. Is the waste the rinse solution collected from the triple rinsing of empty containers. | ____ | ____ |

If Yes, proceed to Section E (ii) (page 11).

If No, proceed to 13.

13. The waste is not hazardous waste, and therefore the Hazardous Chemicals Act and Hazardous Waste Regulation do not apply.

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* A triple rinsed container is one that has been rinsed three times using for each rinse an appropriate, clean solvent in an amount equal to at least 10% of the container volume. Other methods may be used so long as they produce an equivalent cleanliness.

TABLE 2

CHEMICALS THAT MAKE UNRINSED EMPTY CONTAINERS
HAZARDOUS WASTE

| Substance |
|---|
| Acetaldehyde, chloro- |
| Acetamide, N-(aminothioxomethyl)- |
| Acetamide 2-fluoro- |
| Acetic acid, fluoro-, sodium salt |
| Acetimidic acid, N-[(methylcarbamoyl)oxy]thio-, methyl ester |
| 3-(alpha-Acetonylbenzyl)-4-hydroxycoumarin and salts, when present at concentrations greater than 0.3% |
| 1-Acetyl-2-thiourea |
| Acrolein |
| Aldicarb |
| Aldrin |
| Allyl alcohol |
| Aluminum phosphide |
| 5-(Aminomethyl)-3-isoxazolol |
| 4-aAminopyridine |
| Ammonium picrate |
| Ammonium vanadate |
| Arsenic acid |
| Arsenic (III) oxide |
| Arsenic (V) oxide |
| Arsenic pentoxide |
| Arsenic trioxide |
| Arsine, diethyl- |
| Aziridine |
| Barium cyanide |
| Benzenamine, 4-chloro- |
| Benzenamine, 4-nitro- |
| Benzene, (Chloromethyl)- |
| 1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]- |
| Benzenethiol |
| Benzyl chloride |
| Beryllium dust |
| Bis(chloromethyl) ether |
| Bromoacetone |
| Brucine |
| Calcium cyanide |
| Camphene, octachloro- |
| Carbamimidoselenoic acid |
| Carbon bisulfide |
| Carbon disulfide |

| Substance |
|---|
| Diethyl-p-nitrophenyl phosphate |
| O,O-Diethyl O-pyrazinyl phosphorothioate |
| Diisopropyl fluorophosphate |
| Dimethoate |
| 3,3-Dimethyl-1-(methylthio)-2-butanone, O-[(methylamino)carbonyl] oxime |
| O,O-Dimethyl O-p-nitrophenyl phosphorothioate |
| Dimethylnitrosamine |
| alpha, alpha-Dimethylphenethylamine |
| 4,6-Dinitro-o-cresol and salts |
| 4,6-Dinitro-o-cyclohexylphenol |
| 2,4-Dinitrophenol |
| Dinoseb |
| Diphosphoramide, octamethyl- |
| Disulfoton |
| 2,4-Dithiobiuret |
| Dithiopyrophosphoric acid, tetraethyl ester |
| Endosulfan |
| Endothall |
| Endrin |
| Epinephrine |
| Ethanamine, 1,1-dimethyl-2-phenyl- |
| Ethenamine, N-methyl-N-nitroso- |
| Ethyl cyanide |
| Ethylenimine |
| Famphur |
| Fluorine |
| Fluoroacetamide |
| Fluoroacetic acid, sodium salt |
| Fulminic acid, mercury (II) salt |
| Heptachlor |
| 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo, endo- 1,4:5,8-dimethanonaphthalene |
| 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo, exc- 1,4:5,8-demethanonaphthalene |
| 1,2,3,4,10,10-Hexachloro- 1,4,4a,5,8,8a-hexahydro- 1,4:5,8-endo, endo-dimethanonaphthalene |

TABLE 2 (cont'd)

CHEMICALS THAT MAKE UNRINSED EMPTY CONTAINERS
HAZARDOUS WASTE

| Substance |
|---|
| Carbonyl chloride |
| Chlorine cyanide |
| Chloroacetaldehyde |
| p-Chloroaniline |
| 1-(o-Chlorophenyl)thiourea |
| 3-Chloropropionitrile |
| Copper cyanides |
| Cyanides (soluble cyanide salts), not elsewhere specified |
| Cyanogen |
| Cyanogen chloride |
| Dichlorophenylarsine |
| Dieldrin |
| Diethylarsine |
| O,O-Diethyl S-[2-(ethylthio)ethyl] phosphorodithioate |
| Methane, tetranitro- |
| Methanethiol, trichloro- |
| 4,7-Methano-1H-indene, 1,4,5,6,7, 8,8-heptachloro-3a,4,7,7a-tetra-hydro- |
| Methomyl |
| 2-Methylaziridine |
| Methyl hydrazine |
| Methyl isocyanate |
| 2-Methyllactonitrile |
| Methyl parathion |
| alpha-Naphthylthiourea |
| Nickel carbonyl |
| Nickel cyanide |
| Nickel (II) cyanide |
| Nickel tetracarbonyl |
| Nicotine and salts |
| Nitric Oxide |
| p-Nitroaniline |
| Nitrogen dioxide |
| Nitrogen (II) oxide |
| Nitrogen (IV) oxide |
| Nitroglycerine |
| N-Nitrosodimethylamine |
| N-Nitrosomethylvinylamine |
| 5-Norbornene-2,3-dimathanol, 1,4, 5,6,7,7-hexachloro, cyclic sulfite |

| Substance |
|---|
| 1,2,3,4,10,10-Hexachloro- 1,4,4a,5,8, 8a-hexahydro- 1,4:5,8-endo, exo-dimethanonaphthalene |
| Hexachlorohexahydro-exo, exo-dimethanonaphthalene |
| Hexaethyl tetraphosphate |
| Hydrazinecarbothioamide |
| Hydrazine, methyl- |
| Hydrocyanic acid |
| Hydrogen cyanide |
| Hydrogen phosphide |
| Isocyanic acid, methyl ester |
| 3(2H)-Isoxazolone, 5-(aminomethyl)- |
| Mercury, (acetato-O)phenyl- |
| Mercury fulminate |
| Methane, oxybis(chloro- |
| Phosphorothioic acid, O,O-dimethyl-O-[p-((dimethylamino-sulfonyl) phenyl] ester |
| Plumbane, tetraethyl- |
| Potassium cyanide |
| Potassium silver cyanide |
| Propanal, 2-methyl-2-(methylthio)-, O[(methylamino)Carbonyl]oxime |
| Propanenitrile |
| Propanenitrile, 3-chloro- |
| Propanenitrile, 2-hydroxy-2-methyl- |
| 1,2,3-Propanetriol, trinitrate- |
| 2-Propanone, 1-bromo- |
| Propargyl alcohol |
| 2-Propenal |
| 2-Propen-1-ol |
| 1,2 Propylenimine |
| 2-Propyn-1-ol |
| 4-Pyridinamine |
| Pyridine, (S)--3-(1-methyl-2-Pyrro-lidinyl)-, and salts |
| Pyrophosphoric acid, tetraethyl ester |
| Selenourea |
| Silver cyanide |
| Sodium azide |
| Sodium cyanide |
| Strontium sulfide |

TABLE 2 (cont'd)

CHEMICALS THAT MAKE UNRINSED EMPTY CONTAINERS
HAZARDOUS WASTE

| Substance |
|---|
| Octamethylpyrophosphoramide |
| Osmium oxide |
| Osmium tetroxide |
| 7-Oxabicyclo [2.2.1] heptane-2,3-dicarboxylic acid |
| Parathion |
| Phenol, 2-cyclohexyl-4,6-dinitro |
| Phenol, 2,4-dinitro- |
| Phenol, 2,4-dinitro-6-methyl- |
| Phenol, 2,4-dinitro-6-(1-methylpropyl)- |
| Phenol, 2,4,6-trinitro, ammonium salt |
| Phenyl dichloroarsine |
| Phenylmercuric acetate |
| N-Phenylthiourea |
| Phorate |
| Phosgene |
| Phosphine |
| Phosphoric acid, diethyl p-nitrophenyl ester |
| Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester |
| Phosphorofluoric acid, bis(1-methylethyl)-ester |
| Phosphorothioic acid, O,O-diethyl S-(ethylthio)methyl ester |
| Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl) ester |
| Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester |

| Substance |
|---|
| Strychnidin-10-one, and salts |
| Strychnidin-10-one, 2,3,-dimethoxy- |
| Strychnine and salts |
| Sulfuric acid, thallium(1) salt |
| Tetraethyldithiopyrophosphate |
| Tetraethyl lead |
| Tetraethylpyrophosphate |
| Tetranitromethane |
| Tetraphosphoric acid, hexaethyl ester |
| Thallic oxide |
| Thallium (III) oxide |
| Thallium (I) selenite |
| Thallium (I) sulfate |
| Thiofanox |
| Thioimidodicarbonic diamide |
| Thiophenol |
| Thiosemicarbazide |
| Thiourea (2-chlorophenyl)- |
| Thiourea, 1-naphthalenyl- |
| Thiourea, phenyl- |
| Toxaphene |
| Trichloromethanethiol |
| Vanadic acid, ammonium salt |
| Vanadium pentoxide |
| Vanadium (V) oxide |
| Warfarin, when present at concentrations greater than 0.3% |
| Zinc cyanide |
| Zinc Phosphide, when present at concentrations greater than 10% |